SPECIFICATIONS   FOR
LCD   MODULE

CUSTOMER	
CUSTOMER PART NO.	
PART NO.	**12864EYIQY-14H-B(R)**
APPROVED BY	
DATE	

☐ **Approved For Specifications**
☐ **Approved For Specifications & Sample**

APPROVED BY	CHECKED BY	ORGANIZED BY

RECORD   OF   REVISION

Revision Date	Page	Contents	Editor
2008/9/2	--	New Release	Edward

1 FEATURES

(1)   Display format : 128 × 64 dot-matrix ; 1/ 64 duty.

(2)   Construction : STN LCD, Bezel, Zebra, Heat Seal and PCB, Edge type Yellow Green

LED back-light.

(3)   Display Type : STN , yellow-green mode, Transflective , 6 o'clock view

(4)   Common LCD Driver IC: SBN6400G..

(5)   Segment LCD Drive and Controller IC: SBN0064GX-D.

(6)   5V single power input, Built-in DC/DC converter for LCD driving.

(7)   Extended temperature type.

(8)   ROHS compliant.

2 MECHANICAL DATA

Parameter	Stand Value	Unit
Dot size	0.40(W) × 0.40(H)	mm
Dot pitch	0.43(W) × 0.43(H)	mm
Viewing area	60.0(W) × 32.5(H)	mm
Module size (with LED back-light)	75.0(W) × 52.7(H) × 9.0 max (T)	mm

3 ABSOLUTE MAXIMUM RATINGS

Parameter		Symbol	Min	Max	Unit
Logic Circuit Supply Voltage		VDD-VSS	0	7.0	V
LCD Driving Voltage		VDD-VO	0	16	V
Input Voltage		VI	VSS	VDD	V
Extended temp. type	Operating Temp.	TOP	-20	70	°C
	Storage Temp.	TSTG	-30	80	°C

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4 ELECTRO-OPTICAL CHARACTERISTICS

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
----- Electronic Characteristics -----							
Logic Circuit Supply Voltage	VDD-VSS	--	4.5	5.0	5.5	V	
LCD Driving Voltage	VDD-VO	-20 °C	8.5	8.9	9.3	V	
		0 °C	8.3	8.7	9.1		
		25 °C	8.0	8.4	8.8		
		50 °C	7.6	8.0	8.4		
		70 °C	7.3	7.7	8.1		
Input Voltage	VIH	--	0.7 VDD	--	VDD	V	
	VIL	--	VSS	--	0.3 VDD	V	
Logic Supply Current	IDD	VDD = 5V	--	18	24	mA	
----- Optical Characteristics -----							
Contrast	CR	STN type	2	3			Note 1
Rise Time	tr	25°C	--	110	165	ms	Note 2
Fall Time	tf	25°C	--	220	330	ms	
Viewing Angle Range	θ f	25°C & CR≥2	20	--	--	Deg.	Note 3
	θ b		35	--	--		
	θ l		25	--	--		
	θ r		30	--	--		
Frame Frequency	fF	25°C	--	70	--	Hz	
----- LED Back-light Characteristics -----							
Forward Voltage	VF	--	--	4.05	4.3	V	Supply Voltage between A&K
Forward Current	IF	VF=4.05V	--	100	--	mA	
LCM Luminous intensity	VF=4.05V	--	8	--	cd/m^2		

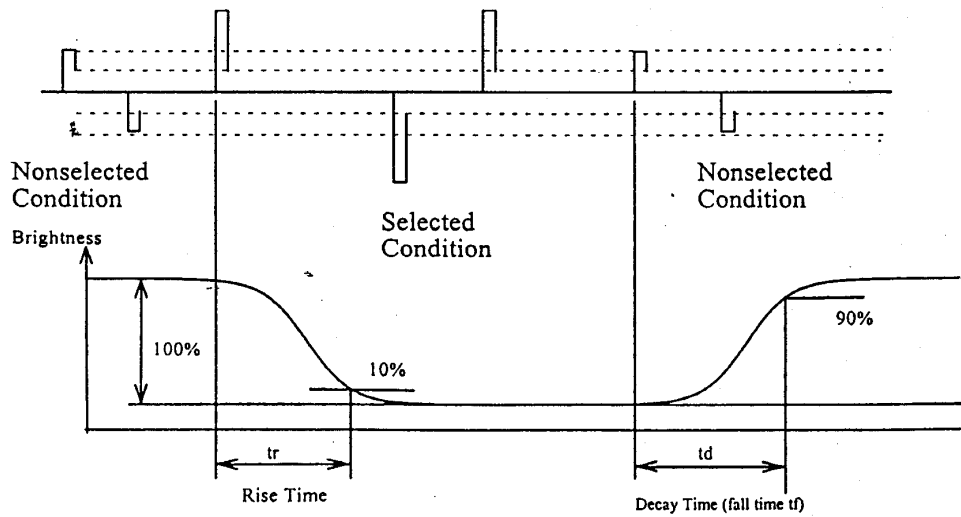* LED Dice number = 2x10=20
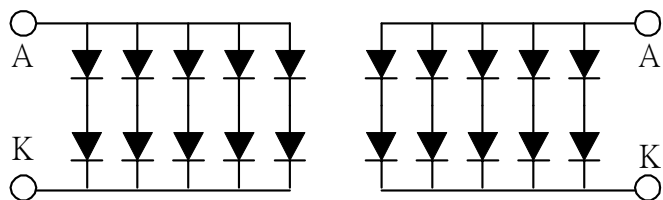
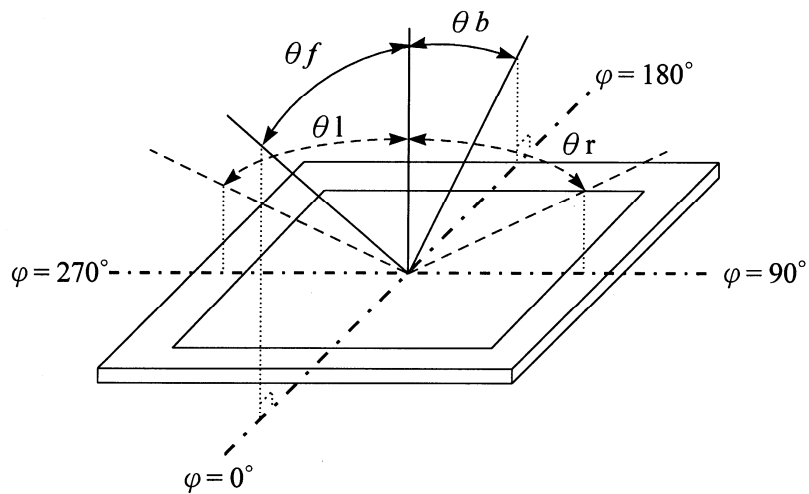(NOTE 1) Contrast ratio :
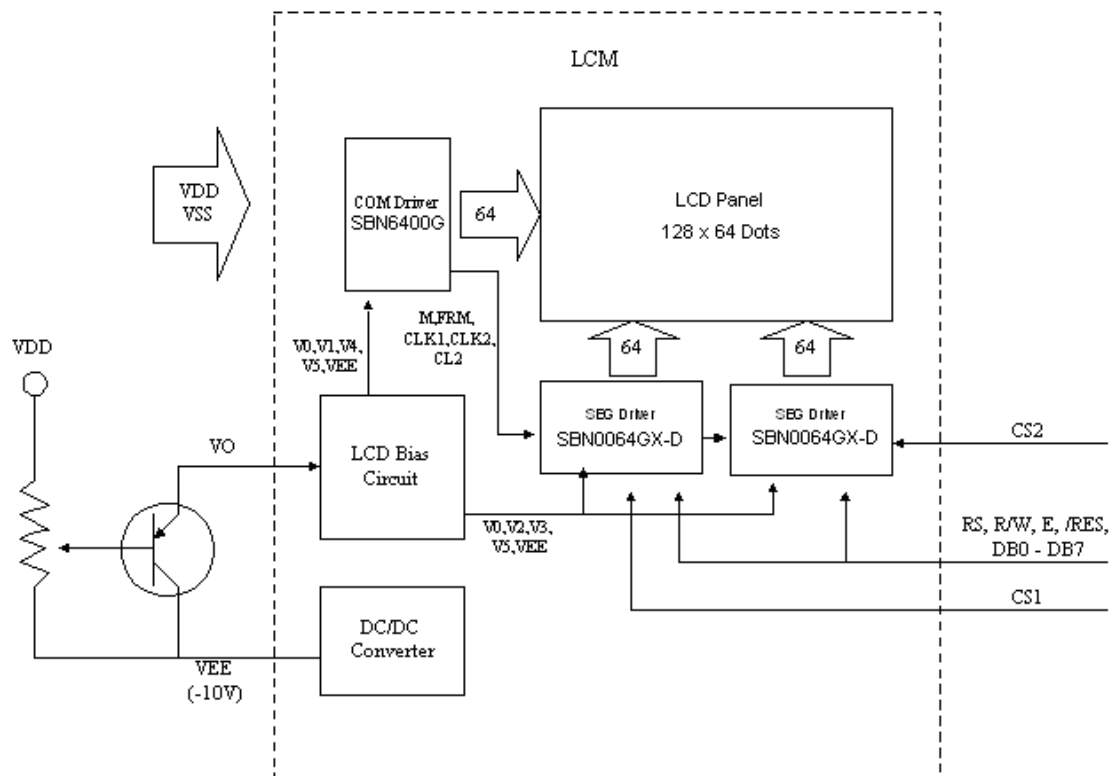
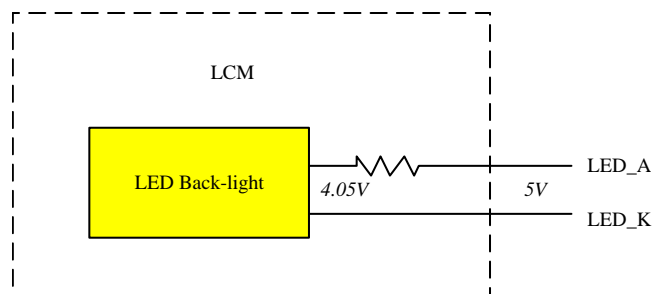CR = (Brightness in OFF state) / (Brightness in ON state)

(NOTE 2) Response time :

Nonselected
Condition

Selected
Condition

Nonselected
Condition

Brightness

100%

10%

90%

tr

Rise Time

td

Decay Time (fall time tf)

(NOTE 3) Viewing angle

θb

θf

$\varphi = 180°$

$\theta 1$

θr

$\varphi = 270°$

$\varphi = 90°$

$\varphi = 0°$

5 BLOCK DIAGRAM & POWER SUPPLY

Using LED Back-light

6 PIN CONNECTIONS

Pin No.	Symbol	Function
1	VDD	Power Supply (+5V)
2	VSS	Ground (0V)
3	VO	Power Supply For LCD (VDD-VO=LCD Driving Voltage)
4-10	DB0-DB7	Data Bus
12	/CS1	Chip Selection For Segment IC1
13	/CS2	Chip Selection For Segment IC2
14	/RST	Reset
15	R/W	H: Data Read L: Data Write
16	D/I	Data or Instruction
17	E	Enable Signal
18	VEE	Negative voltage Output
19	LEDA	LED Supply Voltage (5V)
20	LED K	LED Supply Voltage (0V)

7 TIMING CHARACTERISTICS

7.1 WRITING OPERATION

Fig.16 AC timing for writing to the SBN0064G

V_{DD} = 5 V ±10%; V_{SS} = 0 V; T_{amb} = -20 °C to +75°C.

symbol	parameter	min.	max.	test conditions	unit
t_{CYC}	Enable (E) cycle time	1000			
t_{EWL}	Enable (E) LOW width	450			
t_{EWH}	Enable (E) HIGH width	450			
t_R	Enable (R) rise time		20		
t_F	Enable (F) fall time		20		
t_{AS1}	Write set-up time	140			ns
t_{AH1}	Write hold time	10			
t_{AS2}	C/D, CS1B, CS2B, CS3 set-up time	140			
t_{AH2}	C/D, CS1B, CS2B, CS3 hold time	10			
t_{DSW}	Data setup time (on the data bus)	200		The loading on the data bus is shown in Fig. 18.	
t_{DHW}	Data hold time (on the data bus)	10			

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7.2 READ OPERATION

Fig.17 AC timing for reading from the SBN0064G

V_{DD} = 5 V ±10%; V_{SS} = 0 V; T_{amb} = -20 °C to +75°C.

symbol	parameter	min.	max.	test conditions	unit
t_{CYC}	Enable (E) cycle time	1000			
t_{EWL}	Enable (E) LOW width	450			
t_{EWH}	Enable (E) HIGH width	450			
t_R	Enable (R) rise time		20		
t_F	Enable (F) fall time		20		
t_{AS1}	READ set-up time	140			ns
t_{AH1}	READ hold time	20			
t_{AS2}	C/D, CS1B, CS2B, CS3 set-up time	140			
t_{AH2}	C/D, CS1B, CS2B, CS3 hold time	10			
t_{DDR}	Data delay time (on the data bus)	320		The loading on the data bus is shown in Fig. 18.	
t_{DHR}	Data hold time (on the data bus)	20			

C_L = 50 pF (including wiring and probe capacitance).

Fig.18 Load circuit for each bit of the data bus.

7.3 Power ON/OFF Sequence

POWER ON SEQUENCE

VDD
VSS
0~50 ms

Signal
VSS
T≧20 ms

VO
VSS

POWER OFF SEQUENCE

VDD
VSS
0 ~ 50 ms

T≧20 ms

Signal
VSS

VSS
VO
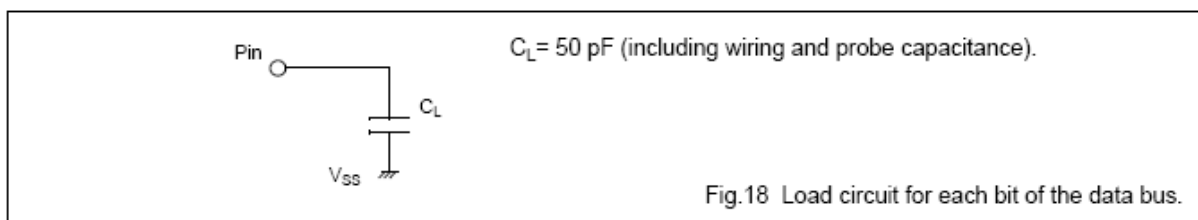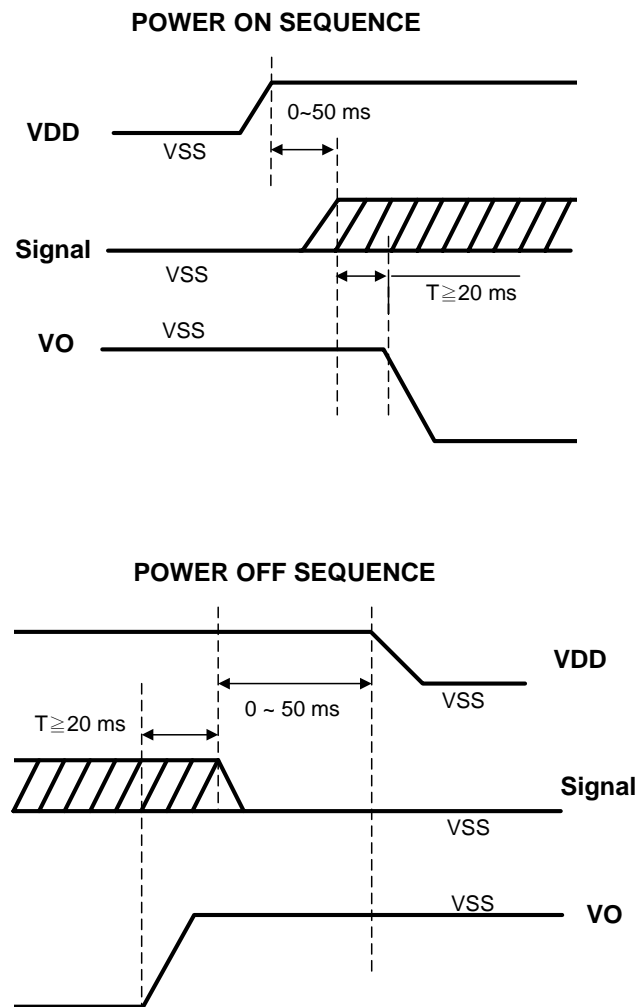
8   INSTRUNTION SET

Instruction	RS	R/W	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 (Y 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 (Z address)	L	L	H	H	Display start line (0~63)						Indicates the display data RAM displayed at the top of the screen.
Status Read	L	H	BUSY	L	ON/OFF	RESET	L	L	L	L	Read status. BUSY L: Ready H: In operation ON/OFF L: Display ON H: Display OFF RESET L: Normal H: Reset
Write Display Data	H	L	Write Data								Writes data (DB0:7) into display data RAM. After writing instruction, Y address is increased by 1 automatically.
Read Display Data	H	H	Read Data								Reads data (DB0:7) from display data RAM to the data bus.

9   QUALITY AND RELIABILITY

9.1   TEST CONDITIONS

Tests should be conducted under the following conditions :

Ambient temperature   : $25 \pm 5°C$

Humidity   : $60 \pm 25\%$ RH.

9.2   SAMPLING PLAN

Sampling method shall be in accordance with MIL-STD-105E , level II, normal single sampling plan .

9.3   ACCEPTABLE QUALITY LEVEL

A major defect is defined as one that could cause failure to or materially reduce the usability of the unit for its intended purpose. A minor defect is one that does not materially reduce the usability of the unit for its intended purpose or is an infringement from established standards and has no significant bearing on its effective use or operation.

9.4   APPEARANCE

An appearance test should be conducted by human sight at approximately 30 cm distance from the LCD module under flourescent light. The inspection area of LCD panel shall be within the range of following limits.

9.5 INSPECTION QUALITY CRITERIA

ITEM	Description of defects				Class of defects	remark
Function	No display		Reject		Major	
	Display abnormal		Reject		Major	
	Missing line		Reject		Major	
Black spots	Ave. dia. D		Area A	Area B	Minor	Two spots must be between about 5 mm
	D≦0.13		Disregard			
	0.13＜D≦0.15		2	2		
	0.13＜D≦0.25		1	2		
	0.25＜D		0	1		
Black line	Width W	Length L	Area A	Area B	Minor	
	≦3.0	≦0.02	Disregard			
	≦2.0	≦0.04	2	2		
	≦1.0	≦0.06	1	2		
		＞0.06	0	0		
Scratch	Width W	Length L	Accept		Minor	
	W≦0.02	---------	Disregard			
	0.02≦W≦0.05	L≦3.0	2			
	W＞0.05	-------	0			
Appearance	PCB copper circuit showed		Reject		Minor	
	PCB scratch was over 5 mm		Reject			
	Sort pad was damaged		Reject			
★ Back-Light	Function didn't work		Reject		Major	
	Some area didn't work		Reject			
	Bright was not even		Reject			
	B/L color was not correct		Reject			
★T/P (DOTS)	D≦0.2mm		Reject		Major	
	0.2mm＜D≦0.3mm		Reject			
	0.3mm＜D		Reject			
★T/P(Scratch)	W≦0.02mm	10mm＜L	Disregard		Major	
	0.05mm≦W≦0.1mm	10mm＜L	1			
	0.1mm≦W	10mm＜L	0			

『★』Symbol means LCM has this material.

Zone A Active area

Zone A Viewing area
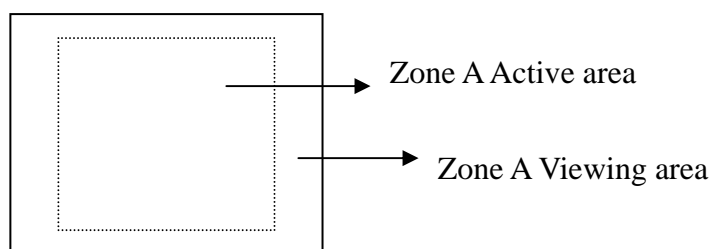
9.6 RELIABILITY

Test Item	Test Conditions	Note
	Extended Temp. type	
High Temperature Operation	70±3°C , t=96 hrs	
Low Temperature Operation	-20±3°C , t=96 hrs	
High Temperature Storage	80±3°C , t=96 hrs	1,2
Low Temperature Storage	-30±3°C , t=96 hrs	1,2
Temperature Cycle	-30°C ~ 25°C ~ 80°C 30 min. 5 min. 30 min. (1 cycle) Total 5 cycle	1,2
Humidity Test	40 °C, Humidity 90%, 96 hrs	1,2
ESD Test	Cp=200pF, R=100Ω Air-discharge ±10KV Shot times : every step 10 times total 60 times.	2
Vibration Test (Without Packing)	Sweep frequency :10 ~ 55 ~ 10 Hz/1min Amplitude : 1.5mm Test direction : X.Y.Z/3 axis Duration : 30min/each axis	2
Vibration Test (Packing)	Sweep frequency : 10 ~ 55 ~ 10 Hz/1min Amplitude : 0.75mm Test direction : X.Y.Z/3 axis Duration : 30min/each axis	2

Note 1 : Condensation of water is not permitted on the module.

Note 2 : The module should be inspected after 1 hour storage in normal conditions

(15-35°C , 45-65%RH).

Definitions of life end point :

- Current drain should be smaller than the specific value.
- Function of the module should be maintained.
- Appearance and display quality should not have degraded noticeably.
- Contrast ratio should be greater than 50% of the initial value.

10 HANDLING PRECAUTIONS

(1) A LCD module is a fragile item and should not be subjected to strong mechanical shocks.

(2) Avoid applying pressure to the module surface. This will distort the glass and cause a change in color.

(3) Under no circumstances should the position of the bezel tabs or their shape be modified.

(4) Do not modify the display PCB in either shape or positioning of components.

(5) Do not modify or move location of the zebra or heat seal connectors.

(6) The device should only be soldered to during interfacing. Modification to other areas of the board should not be carried out.

(7) In the event of LCD breakage and resultant leakage of fluid do not inhale, ingest or make contact with the skin. If contact is made rinse immediately.

(8) When cleaning the module use a soft damp cloth with a mild solvent, such as Isopropyl or Ethyl alcohol. The use of water, ketone or aromatic is not permitted.

(9) Prior to initial power up input signals should not be applied.

(10) Protect the module against static electricity and observe appropriate anti-static precautions.

(11) AMIPRE will provide one year warrantee for all products and three months warrantee for all repairing products.

11 OUTLINE DIMENSION