

A Brighter Solution

AMP DISPLAY INC.

SPECIFICATIONS

COG-Type LCD MODULE

CUSTOMER:	
CUSTOMER PART NO.	
AMP DISPLAY PART NO.	A O - 1 2 8 6 4 X F I Q W - 0 0 H - A (R)
APPROVED BY:	
DATE:	

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APPROVED FOR SPECIFICATIONS

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APPROVED FOR SPECIFICATION AND PROTOTYPES

AMP DISPLAY INC

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1. RECORD OF REVISION

Revision Date	Page	Contents	Editor
2006/5/22	--	New Release	Lorry
2006/6/27	-	Modify LCD driving voltage	Lorry
2006/9/14	3,13	Modify LCD outline dimension and Mechanical data	Tony

2 FEATURES

- (1) Display format : 128×64 dots, 1/64 duty, 1/9 bias.
- (2) Construction : LCD panel , COG and FPC, White LED Back-light.
- (3) Display type : FSTN, Transflective, 6 o'clock view
- (4) Controller : ST7565 or Equivalent
- (5) Extended temperature type.
- (6) ROHS compliant

3 MECHANICAL DATA

Parameter	Stand Value	Unit
Dot size	0.485(W) × 0.485(H)	mm
Dot pitch	0.5(W) × 0.5(H)	mm
Active area	63.985 (W) × 31.985(H)	mm
Viewing area	66.8(W) ×35.5 (H)	mm
Module size	89.7(W) × 111.7(H) × 6.0(T)	mm

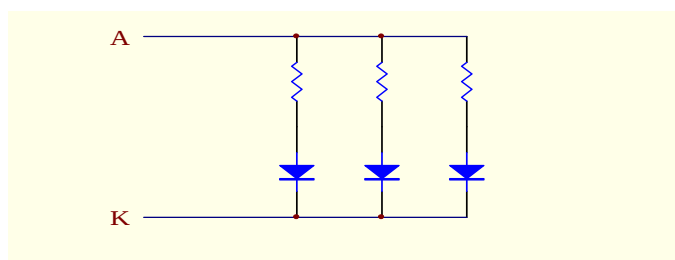
4 ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit
Logic Circuit Supply Voltage	VDD-VSS	-0.3	+7.0	V
LCD Driving Voltage	VLCD	0	10	V
Input Voltage	VI	-0.3	VDD+0.3	V
Operating Temp.	TOP	-20	70	°C
Storage Temp.	TSTG	-30	80	°C

5 ELECTRO-OPTICAL CHARACTERISTICS

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
----- Electronic Characteristics -----							
Logic Circuit Supply Voltage	VDD-VSS	--	--	3.3	--	V	
LCD Driving Voltage	Positive	25°C	8.0	8.5	9.0	V	1/7BIAS
Input Voltage	VIH	--	0.8VDD	--	VDD	V	
	VIL	--	GND	--	0.2VDD	V	
Logic Supply Current	IDD	VDD=3.3V	--	0.2	0.5	mA	
----- Optical Characteristics (STN) -----							
Contrast	CR	--		14			Note 1
Rise Time	tr	25°C	--	250	500	ms	Note 2
Fall Time	tf	25°C	--	300	600	ms	
Viewing Angle Range	θ f	25°C & CR≥2	--	35	--	Deg.	Note 3
	θ b		--	35	--		
	θ l		--	35	--		
	θ r		--	35	--		
Frame Frequency	fF	25°C	--	64	--	Hz	
----- White LED Back-light Characteristics -----							
Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
Forward Voltage	VF	IF=50mA		5		V	Supply Voltage between A&K
Forward Current	IF	VF=5V	--	50	--	mA	Note 4
Luminous of backlight Surface	L	IF=50mA	200	250	--	cd/m ²	Note 5
LED C.I.E	X	IF=50mA	0.28	0.31	0.34		
	Y	IF=50mA	0.29	0.32	0.35		

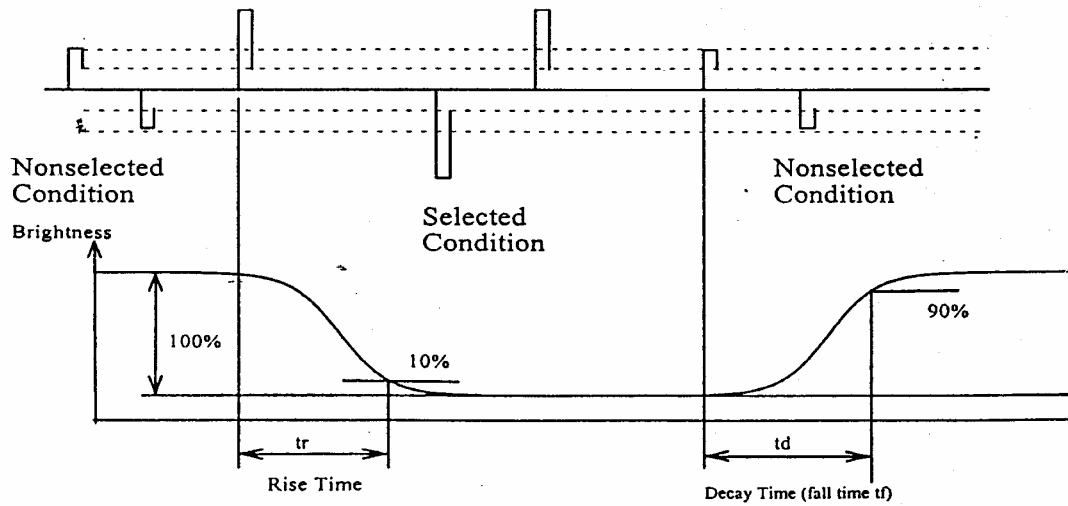
* LED Dice number = 3



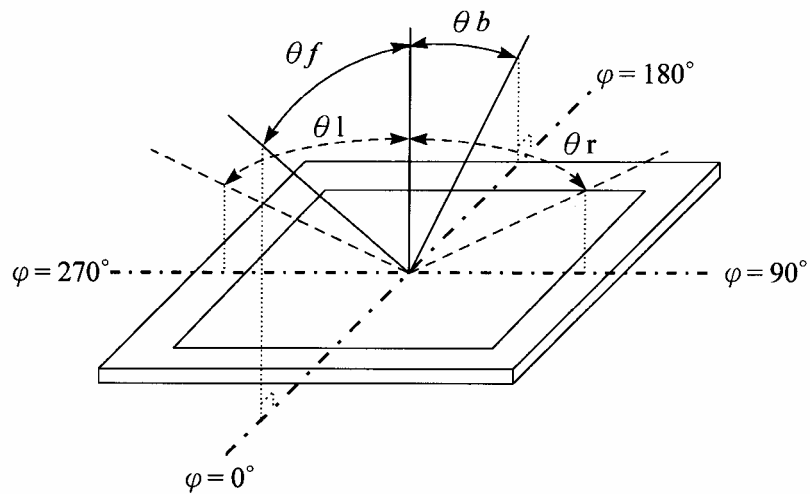
(NOTE 1) Contrast ratio :

$$CR = (\text{Brightness in OFF state}) / (\text{Brightness in ON state})$$

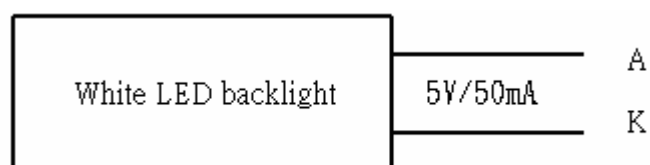
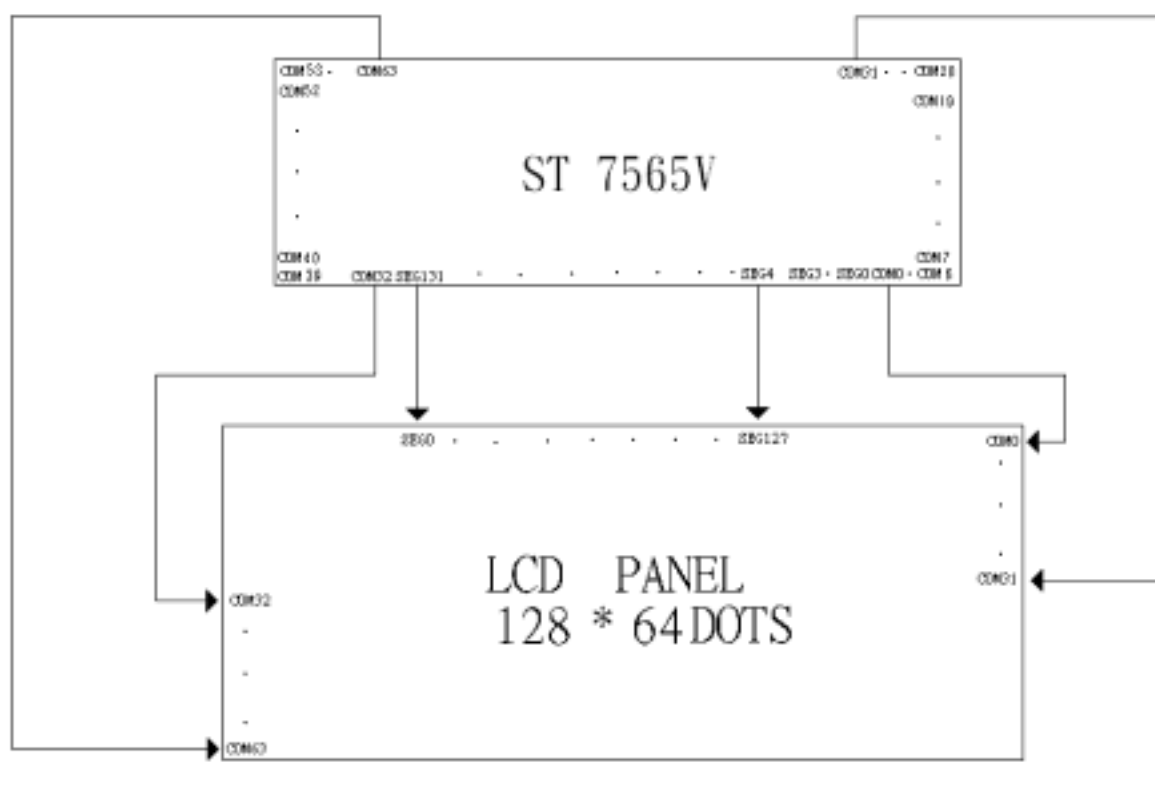
(NOTE 2) Response time :



(NOTE 3) Viewing angle



6 BLOCK DIAGRAM & POWER SUPPLY

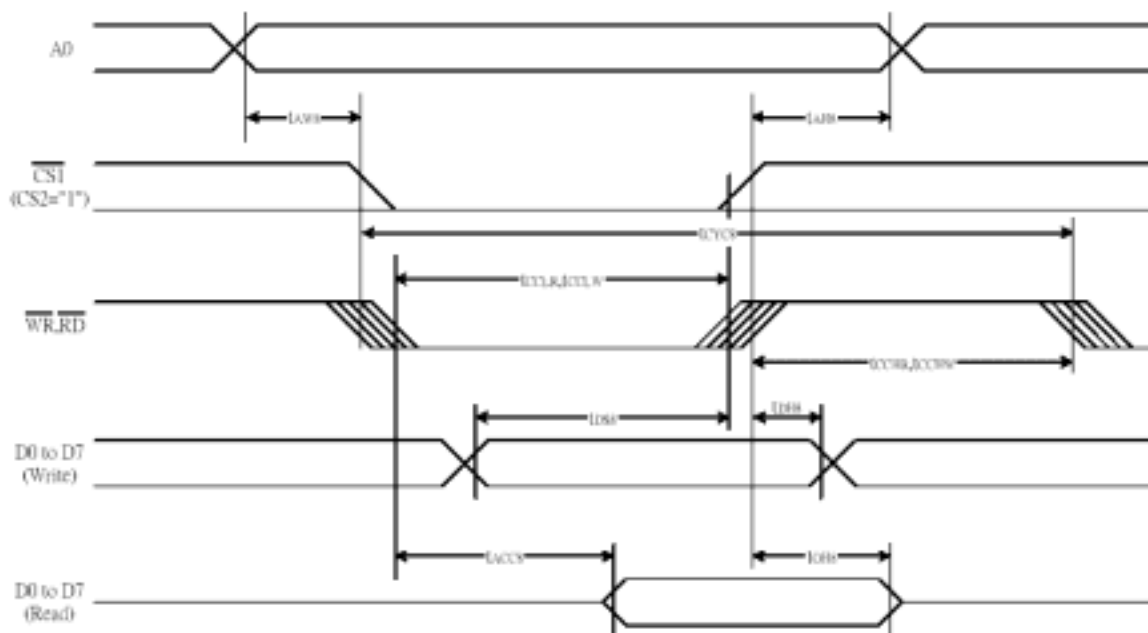


7 INTERFACE

No.	Symbol	Function
1	/CS1	Chip Select Signal
2	/RES	Reset Signal
3	A0	H:D0~D7 are Display Data L:D0~D7 are Instruction
4	/WR	Write Signal
5	/RD	Read Signal
6	D0	Data Bus Line
7	D1	Data Bus Line
8	D2	Data Bus Line
9	D3	Data Bus Line
10	D4	Data Bus Line
11	D5	Data Bus Line
12	D6	Data Bus Line
13	D7	Data Bus Line
14	VDD	Power Supply for logic
15	GND	Power Supply(GND)
16	VOUT	DC/DC Voltage Converter Output
17	CAP3-	Capacitor pad for internal DC/DC voltage converter
18	CAP1+	Capacitor pad for internal DC/DC voltage converter
19	CAP1-	Capacitor pad for internal DC/DC voltage converter
20	CAP2-	Capacitor pad for internal DC/DC voltage converter
21	CAP2+	Capacitor pad for internal DC/DC voltage converter
22	V1	LCD driver supplies voltages
23	V2	LCD driver supplies voltages
24	V3	LCD driver supplies voltages
25	V4	LCD driver supplies voltages
26	V5	LCD driver supplies voltages
27	VR	Voltage Adjustment Pin
28	C86	Interface Mode Select Signal.
29	P/S	Parallel/Serial Data Select Signal.
30	IRS	IRS="H" use the internal resistors IRS="L" Do not use the internal resistors

8 TIMING CHARACTERISTICS

8080-SYSTEM



Parameter	Symbol	Min.	Typ.	Max.	Unit
8080 Series(VDD=2.7~ 3.6V)					
Address Hold Time(A0)	tAH8	0		-	ns
Address Setup Time(A0)	tAW8	0		-	ns
System Cycle Time((A0)	Tcyc8	240			ns
Control L Pulse Width(/WR)	tCCLW	100			ns
Control L Pulse Width(/RD)	tCCLR	140			ns
Control H Pulse Width(/WR)	tCCHW	100			ns
Control H Pulse Width(/RD)	tCCHR	100			ns
Data Setup Time(D0~7)	tDS8	40			ns
Address Hold Time	tDH8	10			ns
/RD access time	tACC8	-		70	ns
Output Disable Time	tOH8	5		50	ns

9. QUALITY AND RELIABILITY

9.1 TEST CONDITIONS

Tests should be conducted under the following conditions :

Ambient temperature : $25 \pm 5^{\circ}\text{C}$

Humidity : $60 \pm 25\% \text{ RH}$.

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

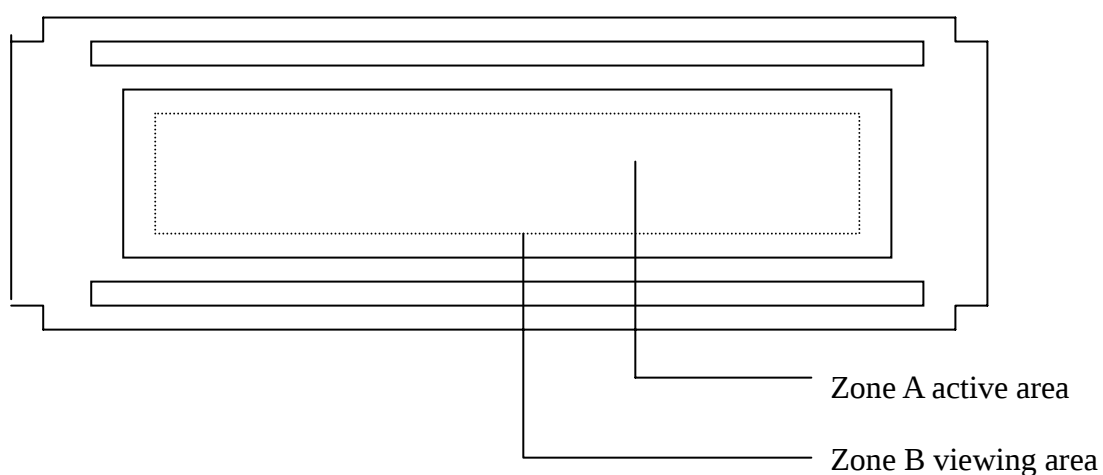
A major defect is defined as one that could cause failure to or materially reduce the usability of the unit for its intended purpose. A minor defect is one that does not materially reduce the usability of the unit for its intended purpose or is an infringement from established standards and has no significant 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 fluorescent light. The inspection area of LCD panel shall be within the range of following limits.

10. INSPECTION QUALITY CRITERIA

Item	Description of defects			Class of Defects	Acceptable level (%)	
Function	Short circuit or Pattern cut			Major	0.65	
Dimension	Deviation from drawings			Major	1.5	
Black spots	Ave . dia . D	area A	area B	Minor	2.5	
	D≤0.2	Disregard				
	0.2<D≤0.3	3	4			
	0.3<D≤0.4	2	3			
	0.4<D	0	1			
Black lines	Width W, Length L		A	B	Minor	2.5
	W≤0.03		disregard			
	0.03<W≤0.05		3	4		
	0.05<W≤0.07 , L≤3.0		1	1		
	See line criteria					
Bubbles in polarizer	Average diameter D 0.2 < D < 0.5 mm for N = 4 , D > 0.5 for N = 1			Minor	2.5	
Color uniformity	Rainbow color or newton ring.			Minor	2.5	
Glass Scratches	Obvious visible damage.			Minor	2.5	
Contrast ratio	See note 1			Minor	2.5	
Response time	See note 2			Minor	2.5	
Viewing angle	See note 3			Minor	2.5	



11 RELIABILITY

Test Item	Test Conditions	Note
	Extend 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
Thermal Shock Test	-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
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.

12 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.

13 OUTLINE DIMENSION

