

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 B 1 G I Q Y - 0 0 H (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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RECORD OF REVISION

Revision Date	Contents	Editor
2006/11/23	New Release	Lorry

1 FEATURES

- (1) Display format : 128 × 64 dot-matrix.
- (2) Construction : STN LCD, Edge type Yellow Green LED back-light.
- (3) Display Type : STN gray type, Transflective , 6 o' clock view
- (4) Controller : SED1565.
- (5) Extended temperature type.
- (6) ROHS compliant.

2 MECHANICAL DATA

Parameter	Stand Value	Unit
Dot size	0.349(W) × 0.418(H)	mm
Dot pitch	0.4364(W) × 0.433(H)	mm
Viewing area	49.6(W) × 31.0(H)	mm
Module size (with LED back-light)	54.6(W) × 42.2(H) × 4.8 max (T)	mm

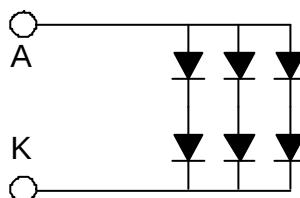
3 ABSOLUTE MAXIMUM RATINGS

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	-40	80	°C

4 ELECTRO-OPTICAL CHARACTERISTICS

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
----- Electronic Characteristics -----							
Logic Circuit Supply Voltage	VDD-VSS	--	2.7	5.0	5.5	V	
LCD Driving Voltage	VDD-V5	25 °C	9.8	10.4	11.0	V	
Input Voltage	VIH	--	0.7 VDD	--	VDD	V	
	VIL	--	VSS	--	0.3 VDD	V	
Logic Supply Current	IDD	VDD = 5V	--	0.3		mA	
----- Optical Characteristics -----							
Contrast	CR	STN type		5			Note 1
Rise Time	tr	25°C	--	150	225	ms	Note 2
Fall Time	tf	25°C	--	200	300	ms	
Viewing Angle Range	θ f	25°C & CR≥2	--	40	--	Deg.	Note 3
	θ b		--	35	--		
	θ l		--	35	--		
	θ r		--	35	--		
Frame Frequency	fF	25°C	--	70	--	Hz	
----- LED Back-light Characteristics -----							
Forward Voltage	VF	--	--	4.05	4.2	V	Supply Voltage between A&K
Forward Current	IF	VF=4.05V	--	30	--	mA	
LCM Luminous intensity		VF=4.05V	--	3	--	cd/m ²	

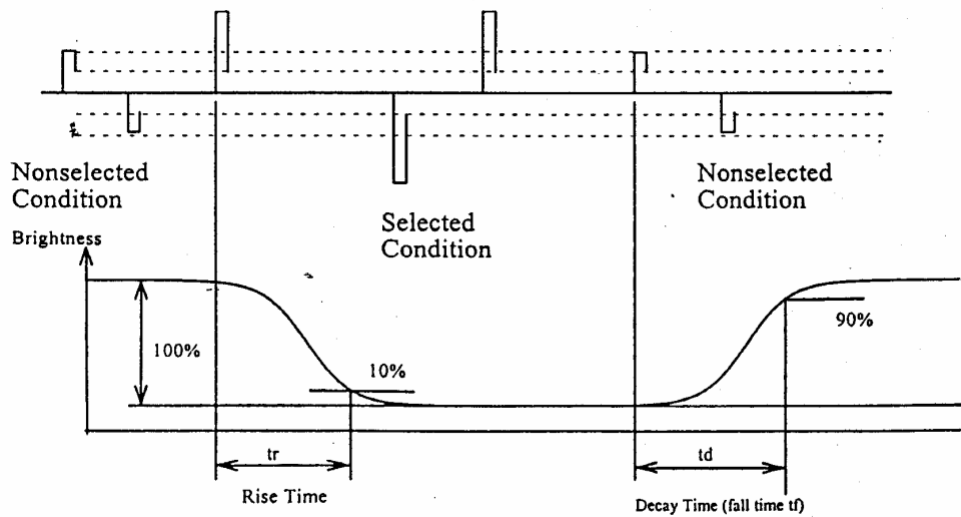
* LED Dice number = 2x3=6



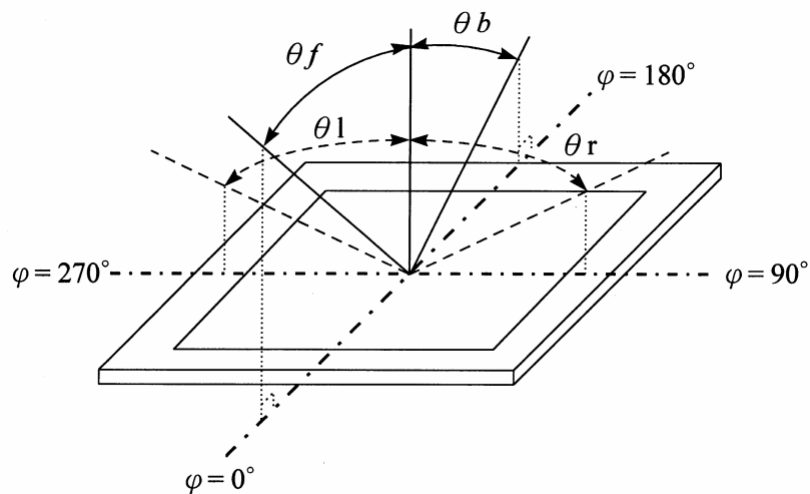
(NOTE 1) Contrast ratio :

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

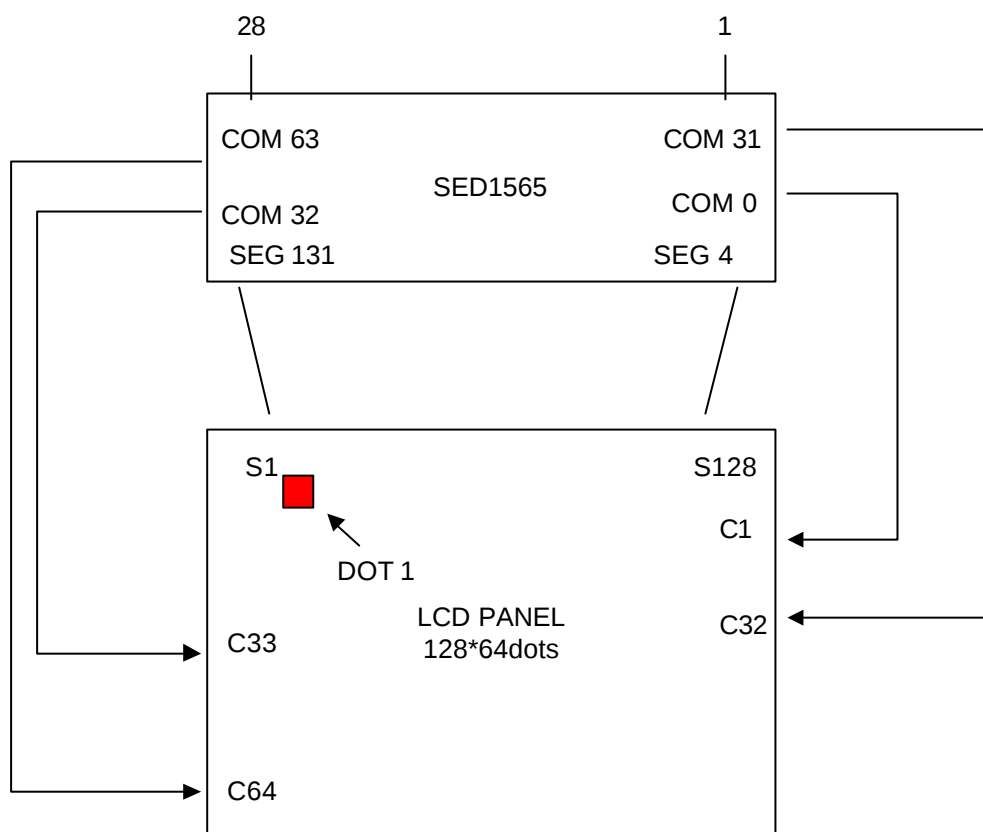
(NOTE 2) Response time :



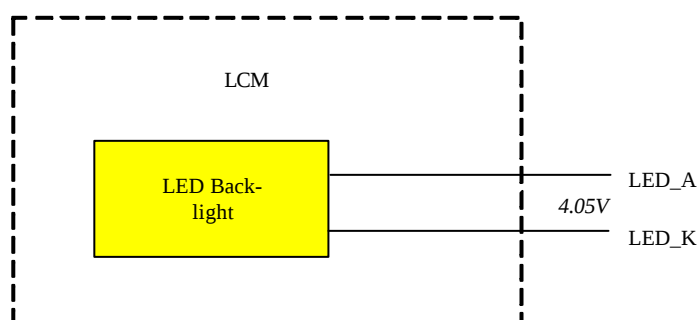
(NOTE 3) Viewing angle



5 BLOCK DIAGRAM & POWER SUPPLY



Using LED Back-light



6 PIN CONNECTIONS

Pin No.	Symbol	Function
1	P/S	Parallel/Serial Data Input Switch. H: Parallel, L: Serial
2	C86	MPU Interface Switch Terminal. H: 6800 L: 8080
3	V5	Power Supply Voltage
4	V4	
5	V3	
6	V2	
7	V1	
8	CAP2+	DC/DC voltage converter
9	CAP2-	
10	CAP1-	
11	CAP1+	
12	CAP3-	
13	VOUT	
14	VSS	GND(+0V)
15	VDD	Power Supply Voltage(+5V)
16~23	D7~D0	Data Input
24	E(/RD)	Enable Signal
25	R/W(/WR)	Read/Write Signal
26	A0	Data/Instruction Selection Signal
27	RES	Reset Signal
28	/CS1	Chip Select Signal

7 TIMING CHARACTERISTICS

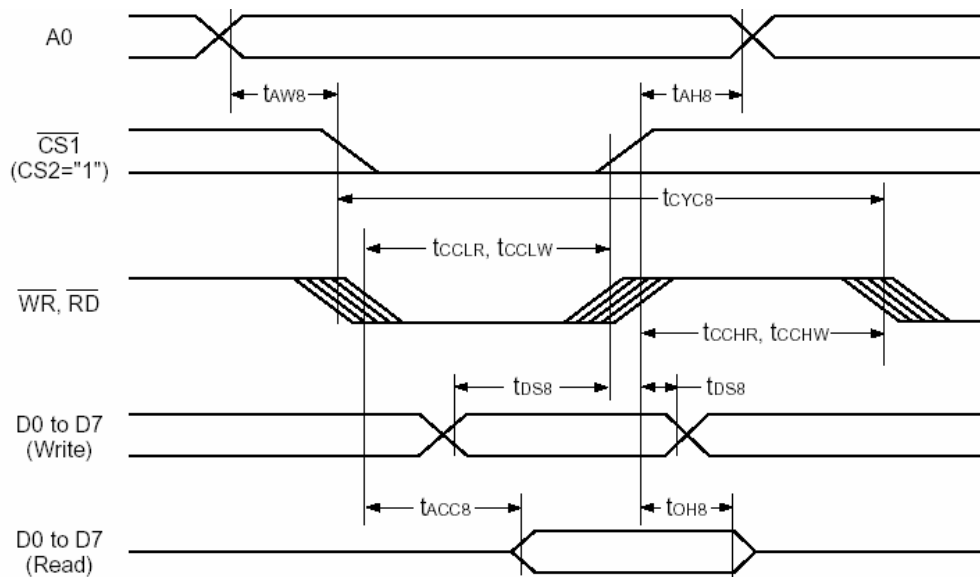


Figure 36

Table 26

($V_{DD} = 4.5\text{ V to }5.5\text{ V}$, $T_a = -40\text{ to }85^\circ\text{C}$)

Item	Signal	Symbol	Condition	Rating		Units
				Min	Max	
Address hold time	A0	t_{AH8}		0	—	ns
Address setup time	A0	t_{AW8}		0	—	ns
System cycle time	A0	t_{CYC8}		166	—	ns
Control L pulse width ($\overline{WR}$)	$\overline{WR}$	t_{CCLW}		30	—	ns
Control L pulse width ($\overline{RD}$)	$\overline{RD}$	t_{CCLR}		70	—	ns
Control H pulse width ($\overline{WR}$)	$\overline{WR}$	t_{CCHW}		30	—	ns
Control H pulse width ($\overline{RD}$)	$\overline{RD}$	t_{CCHR}		30	—	ns
Data setup time	D0 to D7	t_{DS8}		30	—	ns
Address hold time		t_{DH8}		10	—	ns
$\overline{RD}$ access time		t_{ACC8}	$C_L = 100\text{ pF}$	—	70	ns
Output disable time		t_{OH8}		5	50	ns

8 INSTRUNCTION SET

Command	Command Code											Function
	A0	RD	WR	D7	D6	D5	D4	D3	D2	D1	D0	
(1) Display ON/OFF	0	1	0	1	0	1	0	1	1	1	0 1	LCD display ON/OFF 0: OFF, 1: ON
(2) Display start line set	0	1	0	0	1	Display start address					Sets the display RAM display start line address	
(3) Page address set	0	1	0	1	0	1	1	Page address				Sets the display RAM page address
(4) Column address set upper bit	0	1	0	0	0	0	1	Most significant column address				Sets the most significant 4 bits of the display RAM column address.
Column address set lower bit	0	1	0	0	0	0	0	Least significant column address				Sets the least significant 4 bits of the display RAM column address.
(5) Status read	0	0	1	Status				0	0	0	0	Reads the status data
(6) Display data write	1	1	0	Write data								Writes to the display RAM
(7) Display data read	1	0	1	Read data								Reads from the display RAM
(8) ADC select	0	1	0	1	0	1	0	0	0	0	0 1	Sets the display RAM address SEG output correspondence 0: normal, 1: reverse
(9) Display normal/reverse	0	1	0	1	0	1	0	0	1	1	0 1	Sets the LCD display normal/reverse 0: normal, 1: reverse
(10) Display all points ON/OFF	0	1	0	1	0	1	0	0	1	0	0 1	Display all points 0: normal display 1: all points ON
(11) LCD bias set	0	1	0	1	0	1	0	0	0	1	0 1	Sets the LCD drive voltage bias ratio SED1565** 0: 1/9, 1: 1/7 SED1566** 0: 1/8, 1: 1/6 SED1567** 0: 1/6, 1: 1/5
(12) Read/modify/write	0	1	0	1	1	1	0	0	0	0	0	Column address increment At write: +1 At read: 0
(13) End	0	1	0	1	1	1	0	1	1	1	0	Clear read/modify/write
(14) Reset	0	1	0	1	1	1	0	0	0	1	0	Internal reset
(15) Common output mode select	0	1	0	1	1	0	0	0 1	*	*	*	Select COM output scan direction 0: normal direction, 1: reverse direction
(16) Power control set	0	1	0	0	0	1	0	1	Operating mode		Select internal power supply operating mode	
(17) Vs voltage regulator internal resistor ratio set	0	1	0	0	0	1	0	0	Resistor ratio		Select internal resistor ratio (Rb/Ra) mode	
(18) Electronic volume mode set	0	1	0	1	0	0	0	0	0	0	1	Set the Vs output voltage electronic volume register
Electronic volume register set	0	1	0	*	*	Electronic volume value						
(19) Static indicator ON/OFF	0	1	0	1	0	1	0	1	1	0	0 1	0: OFF, 1: ON
Static indicator register set	0	1	0	*	*	*	*	*	*	Mode		Set the flashing mode
(20) Power saver												Display OFF and display all points ON compound command
(21) NOP	0	1	0	1	1	1	0	0	0	1	1	Command for non-operation
(22) Test	0	1	0	1	1	1	1	*	*	*	*	Command for IC test. Do not use this command
(23) Test mode reset	0	1	0	1	1	1	1	0	0	0	0	Enter during the refresh sequence.

(Note) *: disabled data

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

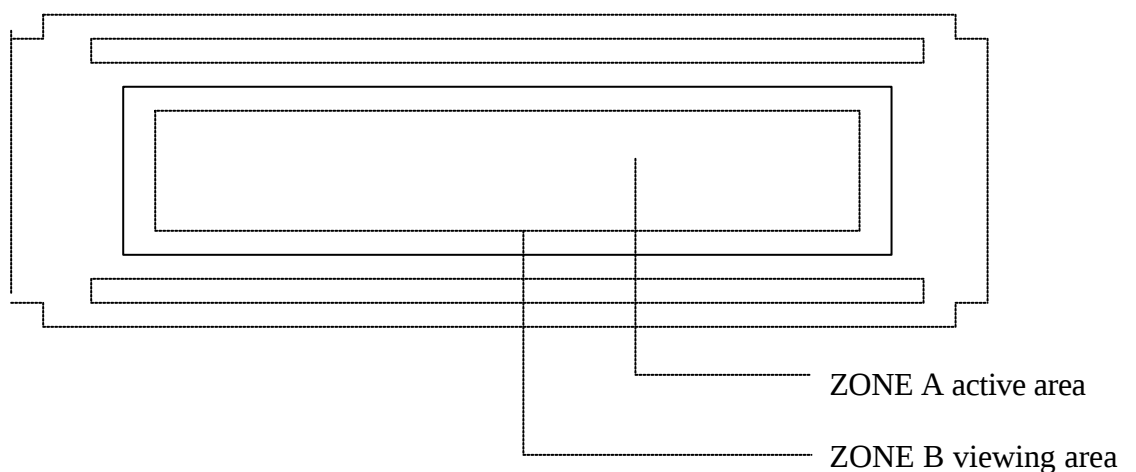
A major defect is defined as one that could cause failure to or materially reduce the usability of the unit for its intended purpose. A minor defect is one that does not materially reduce the usability of the unit for its intended purpose or is an infringement from established standards and has no significant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

9.5 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	



9.6 RELIABILITY

Test Item	Test Conditions	Note
	Extended Temp. type	
High Temperature Operation	-20±3°C , t=96 hrs	
Low Temperature Operation	70±3°C , t=96 hrs	
High Temperature Storage	80±3°C , t=96 hrs	1,2
Low Temperature Storage	-40±3°C , t=96 hrs	1,2
Temperature Cycle	-40°C ~ 25°C ~ 80°C 30 m in. 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.

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 OUTLINE DIMENSION

