

A Brighter Solution

AMP DISPLAY INC.

SPECIFICATIONS

COF LCD MODULE

CUSTOMER:	
CUSTOMER PART NO.	
AMP DISPLAY PART NO.	A F - 1 6 0 1 2 8 A 1 F T Q W - 0 0 H
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
2003/11/4	New Release	Spencer
2003/11/5	Modify the outline dimension	Spencer
2003/12/15	Re-name the module number from T160128-10-1 to AF-160128A1FIQW-00H	Spencer
2004/5/26	Modify the LED Bare Luminous from 200cd/m ² to 320cd/m ²	Spencer

1 FEATURES

- (1) Display format :160× 128 dot-matrix.
- (2) Construction : LCD panel, Edge LED White Back-Light and TCM.
- (3) Display type : FSTN, Negative, polarizer, 6 o'clock view
- (4) Driver : IC SED15E06
- (5) 2.7V single power input.
- (6) Extended temperature type.

2 MECHANICAL DATA

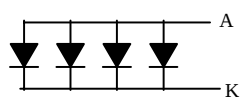
Parameter	Stand Value	Unit
Dot size	0.26(W) × 0.26(H)	mm
Dot pitch	0.28(W) × 0.28(H)	mm
Viewing area	51.8(W) × 38.9(H)	mm
Module size	62.8(W) × 76.2(H) × 5.8 (T)	mm

3 ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit
Logic Circuit Supply Voltage	VDD-VSS	-0.3	4.0	V
LCD Driving Voltage	V3	-0.3	17.0	V
Input Voltage	VIN	-0.3	VDD+0.3	V
Operating Temp.	TOP	-20	70	°C
Storage Temp.	TSTG	-30	80	°C

4 ELECTRO-OPTICAL CHARACTERISTICS

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
----- Electronic Characteristics -----							
Logic Circuit Supply Voltage	VDD-VSS	--	--	2.7	--	V	
LCD Driving Voltage	V0-VSS	25°C	--	11.7	--	V	
Input Voltage	VIH	--	0.8 VDD	--	VDD	V	
	VIL	--	VSS	--	0.2 VDD	V	
Logic Supply Current	IDD	VDD =2.7V	--	0.25	0.5	mA	
----- Optical Characteristics -----							
Contrast	CR	25°C	--	7	--		Note 1
Rise Time	tr	25°C	--	200	--	ms	Note 2
Fall Time	tf	25°C	--	200	--	ms	
Viewing Angle Range	θf	25°C & CR $\geq$ 2	--	40	--	Deg.	Note 3
	θb		--	35	--		
	θl		--	35	--		
	θr		--	35	--		
Frame Frequency	fF	25°C	--	70	--	Hz	
-----White LED Back-light Characteristics -----							
Forward Voltage	VF	--	--	3.2	--	V	Supply Voltage between A&K
Forward Current	IF	VF=3.2V	--	80	--	mA	
LCM Luminous intensity		VF=3.2V	--	45	--	cd/m ²	
Bare Luminous intensity		VF=3.2V	--	320	--	cd/m ²	

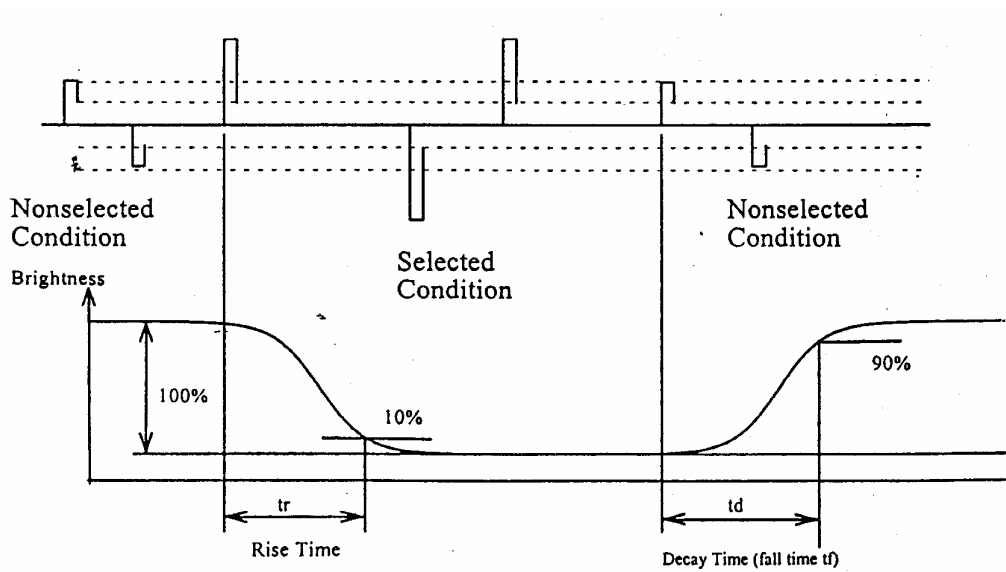


* LED Dice number = 4

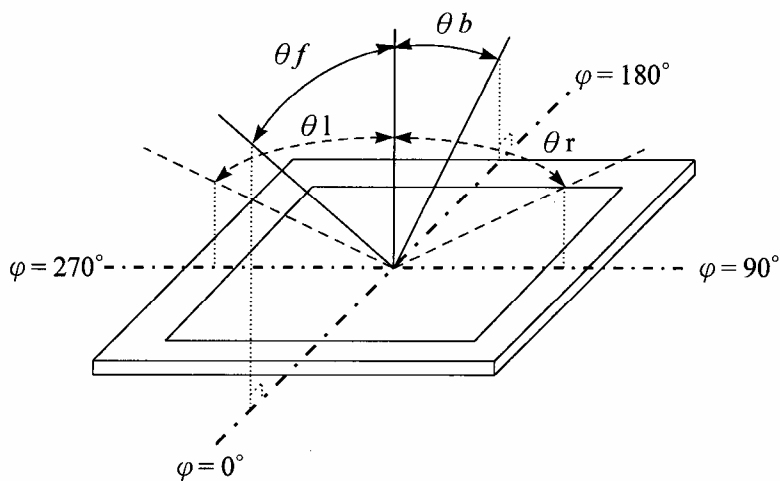
(NOTE 1) Contrast ratio :

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

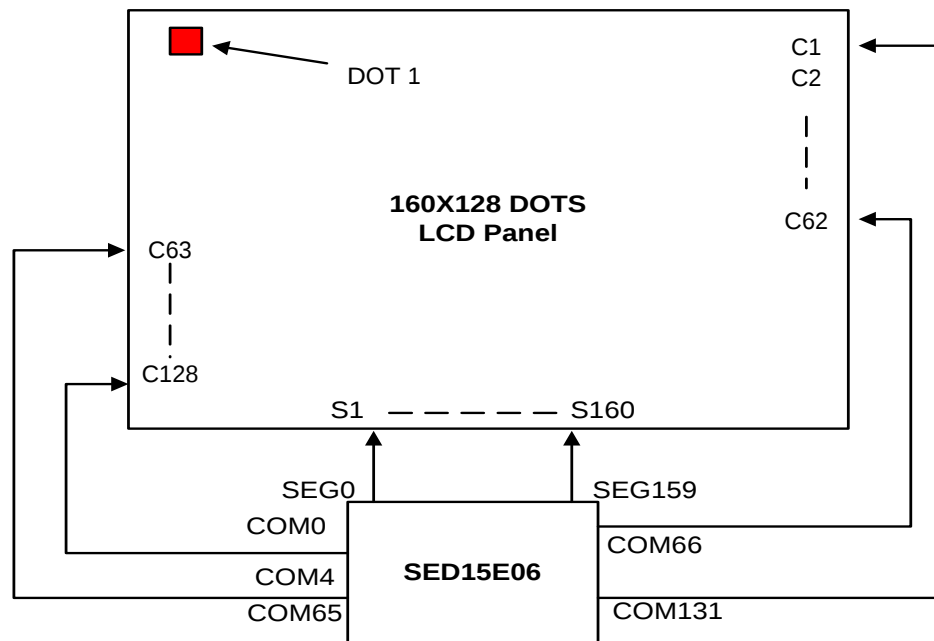
(NOTE 2) Response time :



(NOTE 3) Viewing angle



5 BLOCK DIAGRAM



Note: 1.Using Reverse Common Ouput Mode Selection

6 PIN CONNECTIONS

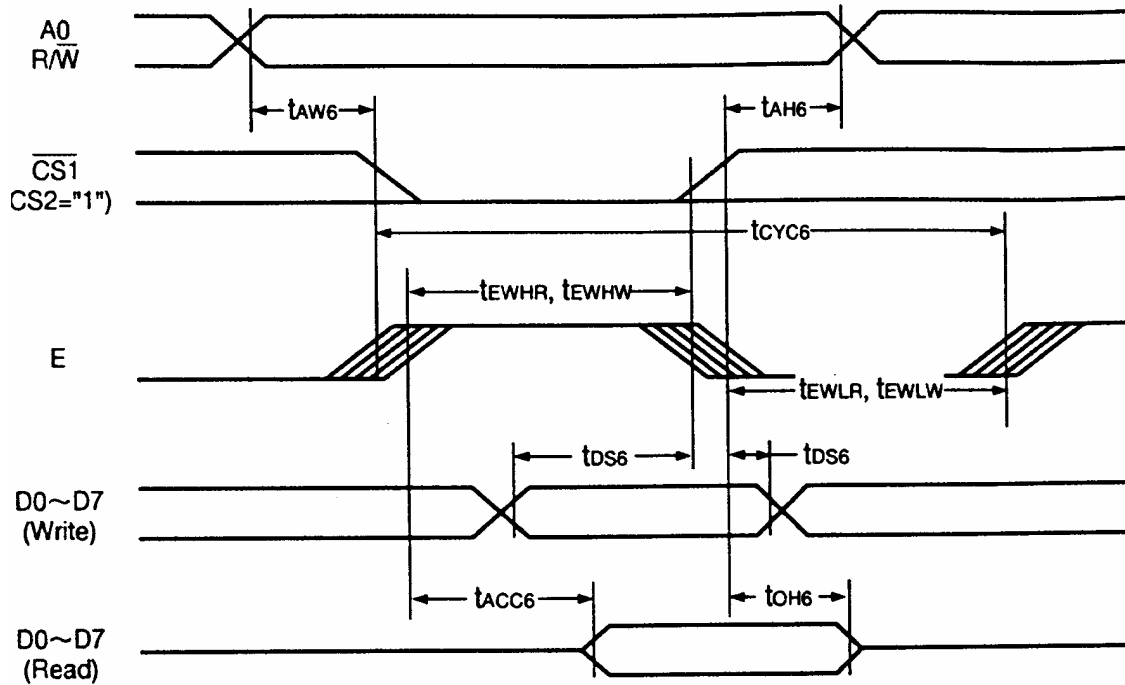
No.	Signal	Level	Function	
1	VDD	-	Power Supply	
2	VSS	-	Ground	
3	D7(SI)	H/L	Data Bus(8bit)	Serial Data Input
4	D6(SCL)	H/L		Serial Clock
5	D5	H/L		
6	D4	H/L		
7	D3	H/L		
9	D2	H/L		
9	D1	H/L		
10	D0	H/L		
11	P/S	H/L	Parallel/Serial Input Data Selection	
12	C86	H/L	MPU Interface Switch terminal	
13	/RD.E	H/L	Read Signal	
14	/WR.R/W	H/L	Write Signal	
15	A0	H/L	Data/Instruction Selection Signal	
16	/RES	H/L	Reset Signal	
17	/CS1	H/L	Chip Select Signal1	
18	TEST	-	IC chip check pins, Lock them to VSS.	

7 TIMING CHARACTERISTICS

8080 Series MPU



6800 Series MPU



Parameter		Signal	Symbol	Min.	Typ.	Max.	Unit
8080 Series(VDD=2.3~ 2.8V)							
Address hold time		A0	t _{AH8}	0		-	ns
Address setup time			t _{AW8}	0		-	
System write cycle time		/WR	t _{WCYC8}	200			
System read cycle time		/RD	t _{RCYC8}	750			
Control L pulse width(/WR)		/WR	t _{CCLW}	50			
Control L pulse width(/RD)		/RD	t _{CCLR}	250			
Control H pulse width(/WR)		/WR	t _{CCHW}	50			
Control H Pulse Width(/RD)		/RD	t _{CCHR}	50			
Data setup time		D0 to D7	t _{DS8}	35			
Data hold time			t _{DH8}	15			
/RD access time			t _{ACC8}	-		250	
Output disable time			t _{OH8}	10		120	
6800 Series(VDD=2.3 V to 2.8 V)							
Address hold time		A0	t _{AH6}	0		-	ns
Address setup time			t _{AW6}	0		-	
System write cycle time		E	t _{WCYC6}	200		-	
System read cycle time			t _{RCYC6}	750			
Data setup time		D0 to D7	t _{DS6}	35		-	
Data hold time			t _{DH6}	15		-	
Access time			t _{ACC6}	-		250	
Output disable time			t _{OH6}	10		120	
Enable H Pulse Time	Read	E	t _{EWHR}	250		-	
	Write		t _{EWHW}	50		-	
Enable L Pulse Time	Read	E	t _{EWLR}	50		-	
	Write		t _{EWLW}	50		-	

8 QUALITY AND RELIABILITY

8.1 TEST CONDITIONS

Tests should be conducted under the following conditions :

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

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

8.2 SAMPLING PLAN

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

8.3 ACCEPTABLE QUALITY LEVEL

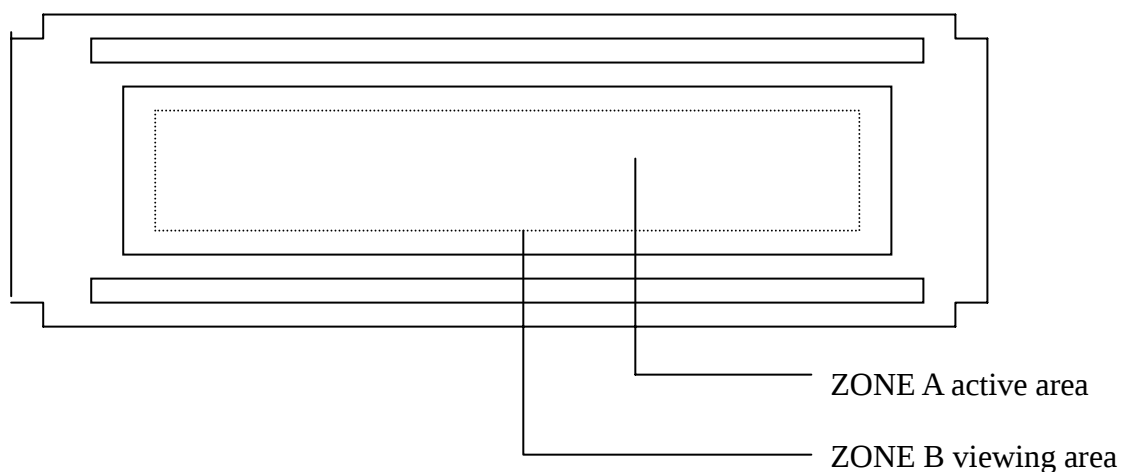
A major defect is defined as one that could cause failure to or materially reduce the usability of the unit for its intended purpose. A minor defect is one that does not materially reduce the usability of the unit for its intended purpose or is an infringement from established standards and has no significant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

8.4 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.

8.5 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



8.6 RELIABILITY

Test Item	Test Conditions	Note
High Temperature Operation	$70 \pm 3^{\circ}\text{C}$, t=96 hrs	
Low Temperature Operation	$-20 \pm 3^{\circ}\text{C}$, t=96 hrs	
High Temperature Storage	$80 \pm 3^{\circ}\text{C}$, t=96 hrs	1,2
Low Temperature Storage	$-30 \pm 3^{\circ}\text{C}$, t=96 hrs	1,2
Humidity Test	40°C , Humidity 90%, 96 hrs	1,2
Thermal Shock Test	-30°C (30 min.) ~ 25°C (5 min.) ~ 80°C (30 min.) (1 cycle) Total 5 cycle	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
($15\text{-}35^{\circ}\text{C}$, 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.

9 HANDLING PRECAUTIONS

- (1) An 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 colour.
- (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.

10 OUTLINE DIMENSION

