



晶采光電科技股份有限公司
AMPIRE CO., LTD.

SPECIFICATIONS FOR LCD MODULE

CUSTOMER	
CUSTOMER PART NO.	
AMPIRE PART NO.	AT-12864IFJ-H
APPROVED BY	
DATE	

AMPIRE CO., LTD.

**TOWER A, 4F, No.114, Sec. 1, HSIN-TAI 5th RD., HIS-CHIH,
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RECORD OF REVISION

Revision Date	Contents
2000/10/6	New Release

1 FEATURES

- (1) Display format :128× 64 dot-matrix.
- (2) Construction : LCD panel, and TAB IC.
- (3) Display type : FSTN, Positive, Transflective, 12 o'clock view
- (4) Driver : IC SED1565T04
- (5) On-chip LCD booster.
- (6) Extended temperature type.

2 MECHANICAL DATA

Parameter	Stand Value	Unit
Dot size	0.34(W) × 0.38(H)	mm
Dot pitch	0.37(W) × 0.41(H)	mm
Viewing area	54.0(W) × 31.0(H)	mm
Module size	58.0(W) × 54.5(H) × 1.9 (T)	mm

3 ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit
Logic Circuit Supply Voltage	VDD-VSS	-0.3	7.0	V
LCD Driving Voltage	VDD-V5	0	16.0	V
Input Voltage	VI	-0.3	VDD+0.3	V
Operating Temp.	TOP	-20	70	°C
Storage Temp.	TSTG	-30	80	°C

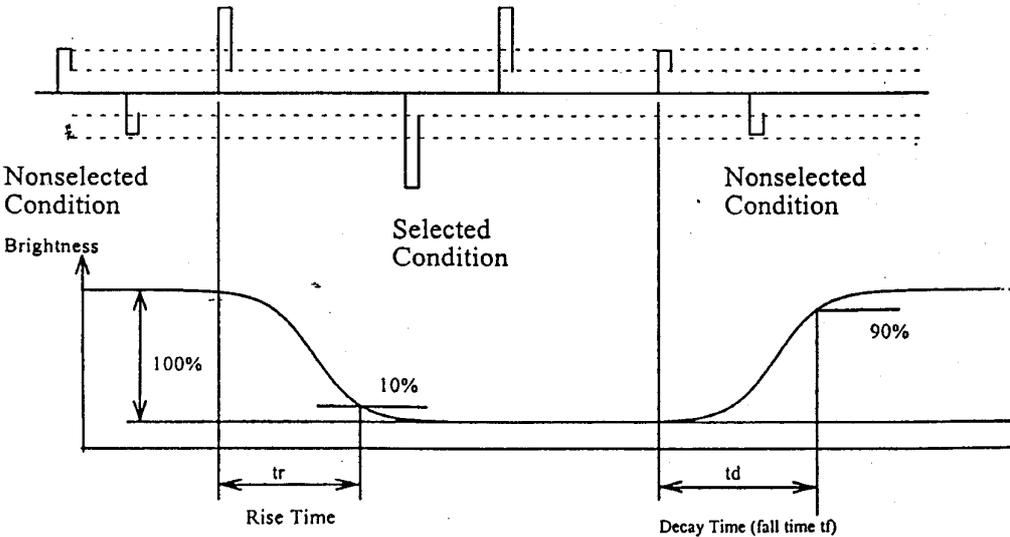
4 ELECTRO-OPTICAL CHARACTERISTICS

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
----- Electronic Characteristics -----							
Logic Circuit Supply Voltage	VDD-VSS	--	--	3.3	--	V	
LCD Driving Voltage	V0-VSS	25°C	--	9.0	--	V	
Input Voltage	VIH	--	0.8 VDD	--	VDD	V	
	VIL	--	VSS	--	0.2 VDD	V	
Logic Supply Current	IDD	VDD = 3V	--	0.5	1.0	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	θ f	25°C & CR≥2	--	30	--	Deg.	Note 3
	θ b		--	40	--		
	θ l		--	35	--		
	θ r		--	35	--		
Frame Frequency	fF	25°C	--	64	--	Hz	

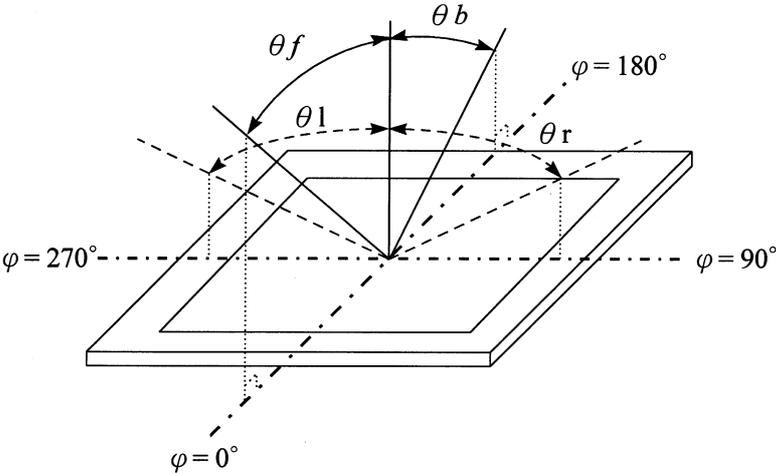
(NOTE 1) Contrast ratio :

CR = (Brightness in OFF state) / (Brightness in ON state)

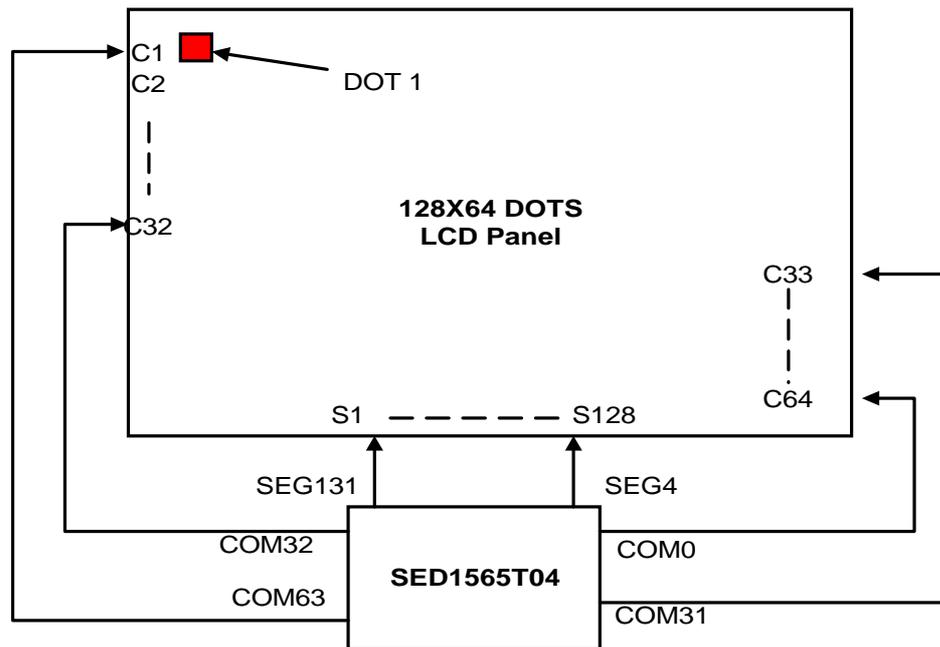
(NOTE 2) Response time :



(NOTE 3) Viewing angle



5 BLOCK DIAGRAM



Note: 1.Using Reverse Common Output Mode Selection
2.Set ADC=1 to Reverse Segment Output/ Address

6 PIN CONNECTIONS

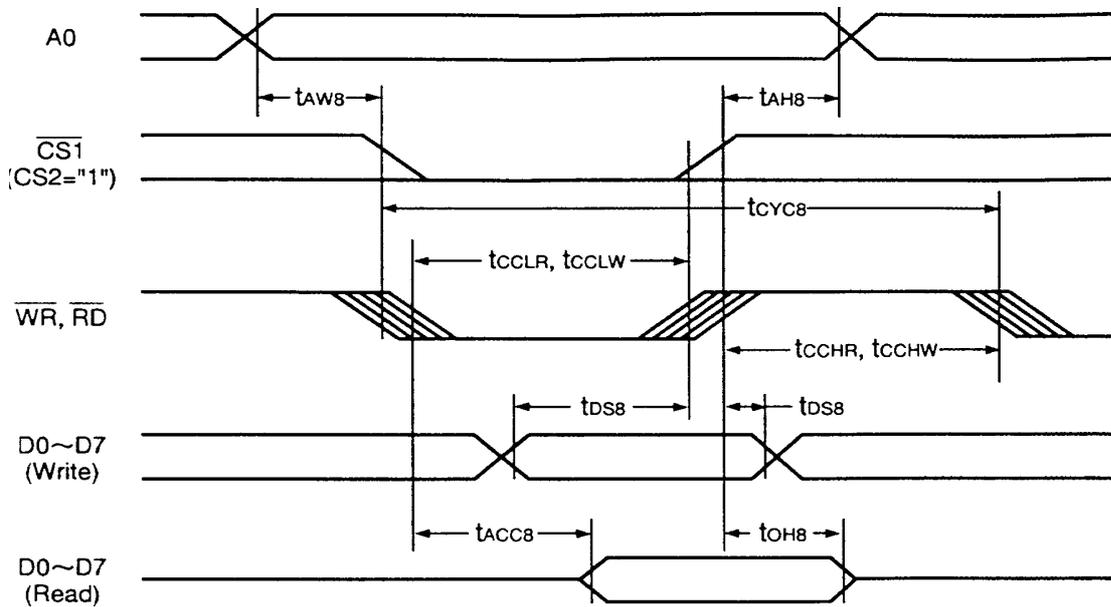
No.	Signal	Level	Function
1	NC	-	Dummy
2	FR	H/L	Alternative Signal
3	CL	H/L	Display Clock Input
4	/DOF	H/L	Display Off Control Signal
5	/CS1	H/L	Chip Select Signal1
6	CS2	H/L	Chip Select Signal2
7	/RES	H/L	Reset Signal
8	A0	H/L	Data/Instruction Selection Signal
9	WR.R/W	H/L	Write Signal
10	RD.E	H/L	Read Signal

(Continued)

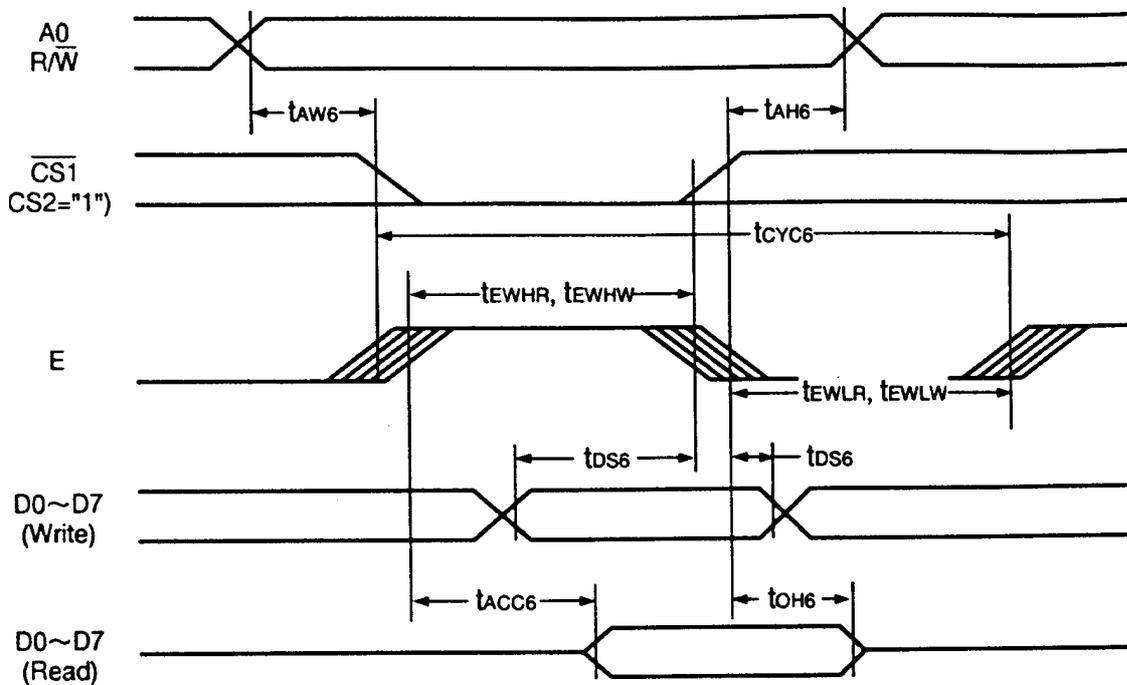
11	D0	H/L	Data Bus(8bit)		
12	D1	H/L			
13	D2	H/L			
14	D3	H/L			
15	D4	H/L			
16	D5	H/L			
17	D6(SCL)	H/L			Serial Clock
18	D7(SI)	H/L			Serial Data Input
19	VDD	-	Power Supply		
20	VSS	-	Ground		
21	VSS2	-	Reference Power Supply for Setup Voltage Circuit		
22	VOUT	H/L	DC/DC Voltage Converter Output		
23	CAP3-	H/L	DC/DC Voltage Converter Capacitor3-		
24	CAP1+	H/L	DC/DC Voltage Converter Capacitor1+		
25	CAP1-	H/L	DC/DC Voltage Converter Capacitor1-		
26	CAP2-	H/L	DC/DC Voltage Converter Capacitor2-		
27	CAP2+	H/L	DC/DC Voltage Converter Capacitor2+		
28	VRS	H/L	Output Voltage Regulator		
29	VDD	-	Power Supply		
30	V1	H/L	Multi Level Voltage Output1		
31	V2	H/L	Multi Level Voltage Output2		
32	V3	H/L	Multi Level Voltage Output3		
33	V4	H/L	Multi Level Voltage Output4		
34	V5	H/L	Multi Level Voltage Output5		
35	VR	H/L	Output Voltage Regulator Terminal		
36	VDD	-	Power Supply		
37	M/S	H/L	Master/Slave Selection		
38	CLS	H/L	Clear Signal		
39	C86	H/L	MPU Interface Switch terminal		
40	P/S	H/L	Parallel/Serial Input Data Selection		
41	HPM	H/L	Power Control Terminal		
42	IRS	H/L	Select Resistors for V5 Voltage Adjust		
43	NC	-	Dummy		

7 TIMING CHARACTERISTICS

7.1 8080 Series MPU



6800 Series MPU



Parameter	Symbol	Min.	Typ.	Max.	Unit
8080 Series(VDD=2.7~4.5V)					
Address Hold Time(A0)	tAH8	0		-	ns
Address Setup Time(A0)	tAW8	0		-	ns
System Cycle Time((A0)	Tcyc8	300			ns
Control L Pulse Width(/WR)	tCCLW	60			ns
Control L Pulse Width(/RD)	tCCLR	120			ns
Control H Pulse Width(/WR)	tCCHW	60			ns
Control H Pulse Width(/RD)	tCCHR	60			ns
Data Setup Time(D0~7)	tDS8	40			ns
Address Hold Time	tDH8	15			ns
/RD access time	tACC8	-		140	ns
Output Disable Time	tOH8	10		100	ns
6800 Series(VDD=2.7 V to 4.5 V)					
Address Hold Time(A0)	tAH6	0		-	ns
Address Setup Time(A0)	tAW6	0		-	ns
System Cycle Time(A0)	tCYC6	300		-	ns
Data Setup Time	tDS6	40		-	ns
Data Hold Time	tDH6	15		-	ns
Data Access Time	tACC6	-		140	ns
Output Disable Time	tOH6	10		100	ns
Enable H Pulse Time	Read	tCCHW	120	-	ns
	Write	tCCHR	60	-	ns
Enable L Pulse Time	Read	tCCLW	60	-	ns
	Write	tCCLR	60	-	ns

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

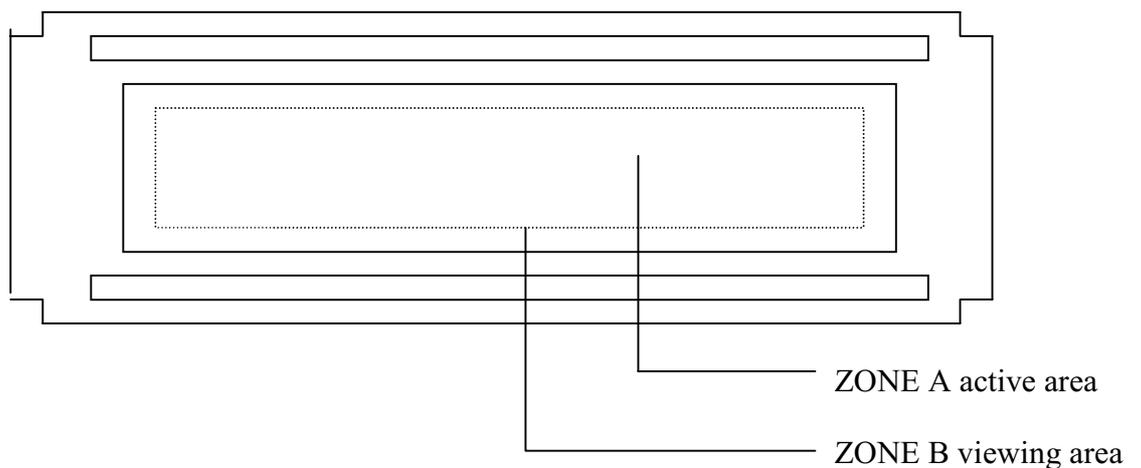
A major defect is defined as one that could cause failure to or materially reduce the usability of the unit for its intended purpose. A minor defect is one that does not materially reduce the usability of the unit for its intended purpose or is an infringement from established standards and has no significant 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
	$D \leq 0.2$	Disregard			
	$0.2 < D \leq 0.3$	3	4		
	$0.3 < D \leq 0.4$	2	3		
	$0.4 < D$	0	1		
Black lines	Width W, Length L	A	B	Minor	2.5
	$W \leq 0.03$	disregard			
	$0.03 < W \leq 0.05$	3	4		
	$0.05 < W \leq 0.07, L \leq 3.0$	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± 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
Humidity Test	40°C , Humidity 90%, 96 hrs	1,2
Temperature Cycle	-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
(15-35°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.

9 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.

