

PRODUCT SPECIFICATIONS



BONA
Display Specialist

BTC8006KNTDA

Product

Standard LCD Module
128(RGB) x 160 Dots graphic type
1.8" 65K CSTN NEGATIVE LCD
COG bonding type
Wide temperature
Without back light
Rohs compliance

Version	Prepared / dd-mm-yy	Approved / dd-mm-yy
A	ERING/ 24-06-06	Zhanghong / 26-06-06

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1. Revision History

Version	Summary	Date dd-mm-yy
A	Original	24-06-06

2. MODULE CLASSIFICATION INFORMATION

B T _____ - _____ - _____ - _____ - _____
(a) (b) (c) (d) (e) (f) (g) (h)

(a) BT: Company Name Abbreviation

(b) Product Type

T—TFT (NUL)

C—CSTN

S—STN

O—OTHER

(c) Product Serial Number

(d) Number of Columns

A-16 B-32 C-64 D-67 E-80 F-96 G-100 H-102

I-112 J-120 K-128 L-130 M-132 N-160 O-176

P-220 Q-234 R-240 S-320 T-480 U-640 V-960

(e) Number of Rows

A-16 B-32 C-64 D-67 E-80 F-96 G-100 H-102

I-112 J-120 K-128 L-130 M-132 N-160 O-176

P-220 Q-234 R-240 S-320 T-480 U-640 V-960

(f) Display Mode

T:Transmissive R:Reflective F:Transflective C:Oled Color

M:Oled Mono

(g) Optimal View Direction

D---6 O’CLOCK

U—12 O’CLOCK

L—9 O’CLOCK

R—3 O’CLOCK

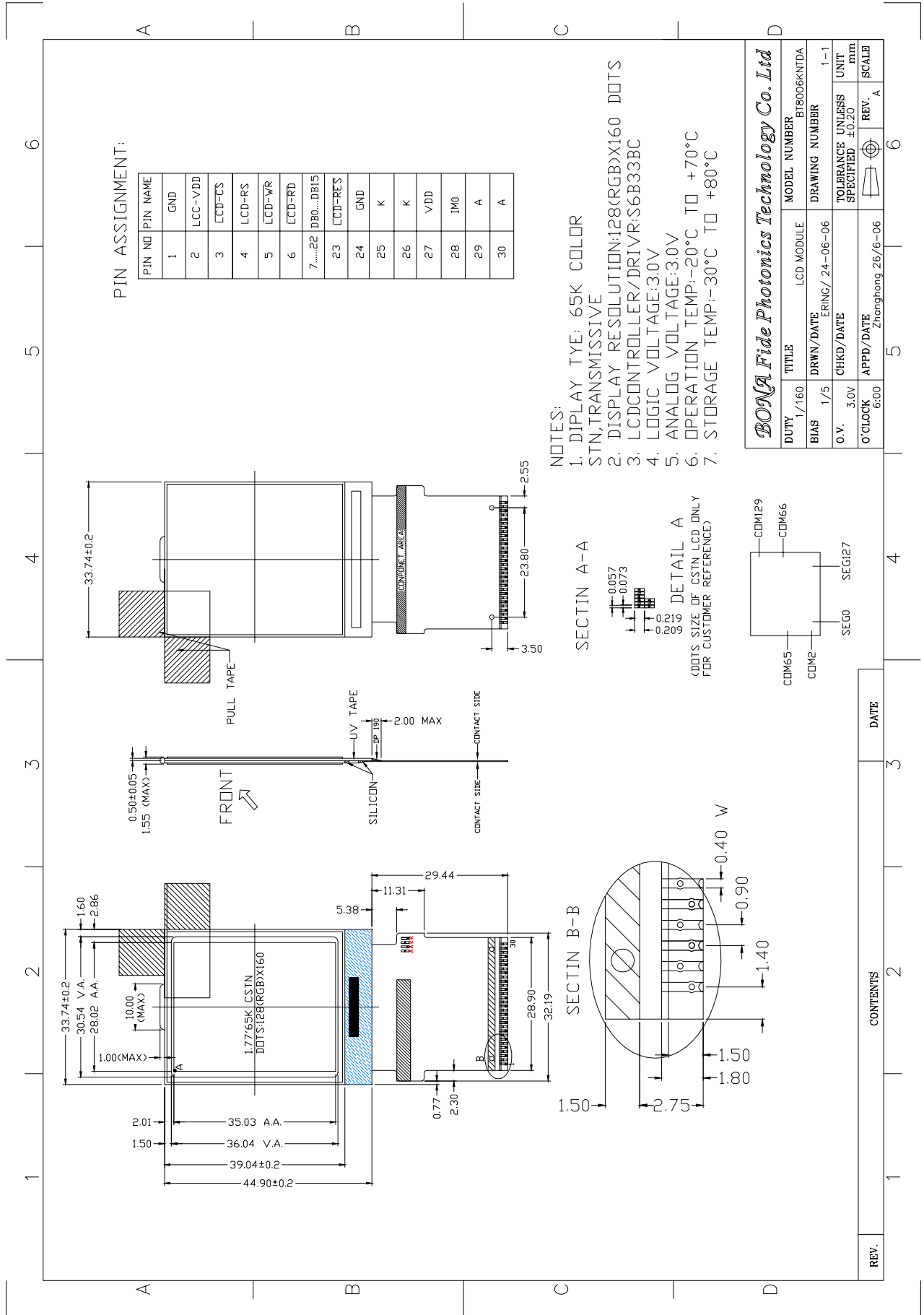
O—Other

(h) Product Version: From A to Z

3. PHYSICAL DATA

Item	Contents	Unit
Display size (diagonal)	1.8" CSTN, Negative	---
Display type	Transmissive	---
LCD duty	1/162	---
LCD bias	1/5	---
Viewing direction	6:00	O'clock
Module size (W×H×T)	33.74 × 74.34 × 1.55 (MAX)	mm
Viewing area(W×H)	30.54 × 36.04	mm
Active area (W×H)	28.02 × 35.03	mm
Number of dots	128(RGB) × 160	dot
Dot size(W×H)	0.218 × 0.203	mm
Dot spacing(W×H)	0.012 × 0.012	mm
Dot pitch (W×H)	0.219(RGB) × 0.219	mm
Operation temperature	-20 ~70	
Storage temperature	-30 ~80	
Weight	TBD	G
LCD controller/Driver	S6B33B6C (COG) or equivalent	---

4. OUTLINE DIMENSIONS



BONA Fide Photonics Technology Co. Ltd

DUTY	TITLE	MODEL NUMBER
1/160	LCD MODULE	BT8006KNTDA
BIAS	DRWN/DATE	DRAWING NUMBER
1/5	ERING/ 24-06-06	1-1
O.V.	CHKD/DATE	TOLERANCE UNLESS SPECIFIED
3.0V		±0.20
O'CLOCK	APPD/DATE	REV.
6:00	Zhonghong 26/6-06	A

5. ABSOLUTE MAXIMUM RATINGS

5-1. Electrical Maximum Ratings for IC Only

Item	Symbol	Min	Max	Unit
Supply voltage range	V_{DD}	-0.3	+4.0	V
LCD Power supply voltage range	$V_{CC}-V_{EE}$	---	20	V
Input voltage range	V_{IN}	-0.3	$V_{DD}+0.3$	V

Note: The modules may be destroyed if they are used beyond the absolute maximum ratings.
All voltage values are referenced to GND=0V.

5-2. Environmental Conditions

Item	Operating temperature (Topr)		Storage temperature (Tstg) (Note 1)		Remark
	Min	Max	Min	Max	
Ambient temperature (Ta)	-20	+70	-30	+80	Dry
Humidity (Note 1)	90% max, RH for Ta 40 <50% RH for 40 <Ta Maximum operating temperature				No condensation
Vibration (IEC 68-2-6) cells must be mounted on a suitable connector	Frequency:10~55Hz Amplitude:0.75 Duration:20 cycles in each direction				3 directions
Shock (IEC 68-2-27) Half-sine pulse shape	Pulse duration:11 ms Peak acceleration: 981m/s ² =100g Number of shocks: 3 shocks in 3 mutually perpendicular axes.				3 directions

Note 1: Product cannot sustain at extreme storage conditions for long time

6. ELECTRICAL CHARACTERISTICS

6-1. Typical Electrical Characteristics (At Ta=25 , VDD=3.0V, GND=0V)

Item	Symbol	Conditions	Min	Typ	Max	Unit
Supply voltage (logic)	VDD-GND		---	3.0	---	V
Supply voltage (LCD)	VLCD		---	TBD	---	V
Input Signal Voltage	V _{IL}	“H” level	0.8VDD3	---	VDD3	V
	V _{IH}	“L” level	GND	---	0.2VDD3	V
Supply current (Logic & LCD)	IDD		---	TBD	---	mA
Supply voltage of white LED02 backlight	VLED	Forward Current=15mA	---	TBD	---	Cd/m ²
Luminance of backlight (on the backlight surface)		Number of LED Dies=2		TBD	---	

Note (1): There is tolerance in optimum LCD driving voltage during production and it will be within the specified range.

6-2. Timing Characteristics

6-2-1. Reset Timing

At Ta=-20 To +70 , VDD=3.0V,GND=0V

Item	Signal	Symbol	Condition	Min	Max	Unit
Reset low pulse width	RSTB	T _{RW}		1000	---	ns
Reset time	---	T _R		---	1000	ns

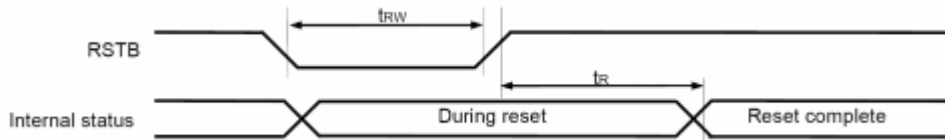


Figure 1: Reset timing

6-2-2. Read/Write Characters (6800-series MPU)

At Ta=-20 To +70 , VDD=3.0V,GND=0V

Item	Signal	Symbol	Condition	Min	Max	Unit
Address setup time	RS	t _{AS68}		0		ns
Address hold time	R/W	t _{AH68}		0		ns
System cycle time (Write)		t _{CY68}		50		ns
Enable width high for write	RDB	t _{EWH68(W)}		20		ns
Enable width low for write	(E)	t _{EWL68(W)}		20		ns
Enable width high for read	RDB	t _{EWH68(R)}		60		ns
Enable width low for read	(E)	t _{EWL68(R)}		20		ns
Data setup time		t _{DS68}		5		ns
Data hold time		t _{DH68}		5		ns
Read access time	D0 to D7	t _{ACC68}	CL=100Pf		80	ns
Output disable time		t _{OD68}	no load	20		ns

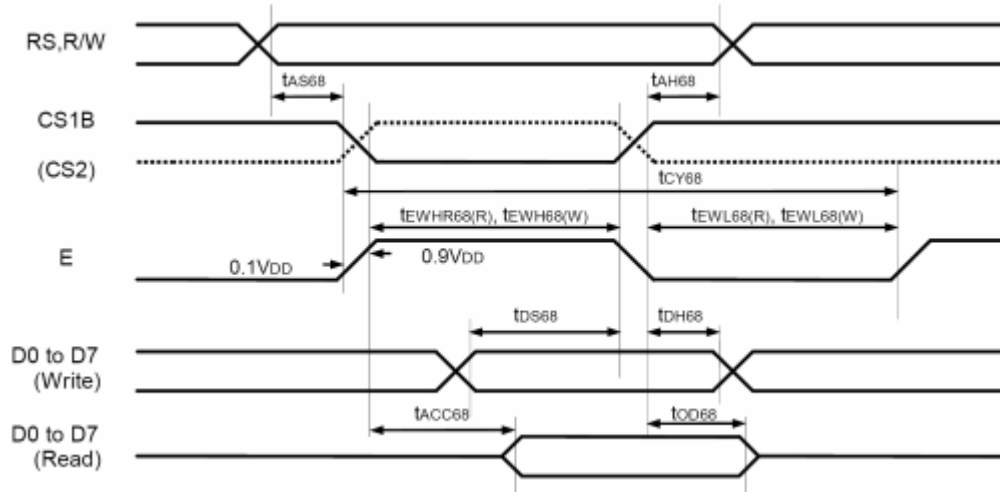
NOTE: The input signal rise time and fall time (tr, tf) is specified at 10 ns or less.

(tr+ tf) < (t_{CY68}-t_{EWH68} (W)- t_{EWL68}(W) for write,

(tr+ tf) < (t_{CY68}-t_{EWH68}(R)- t_{EWL68}(R) for read.

* T_{pwl68} (W)-and t_{PWH68}(R) is specified in the overlapped period when CS1B is low (CS2 is high) And WRB (RDB) is low.

Figure 5: Parallel Interface (6800-series MPU) Timing Diagram.



* $t_{EWH68}(W)$ and $t_{EWH68}(R)$ is specified in the overlapped period when CS1B is low (CS2 is high and E is high).

Figure 2: Parallel interface (6800-series MPU) timing diagram

6-2-3. Read/Write Characters (8080-series MPU)

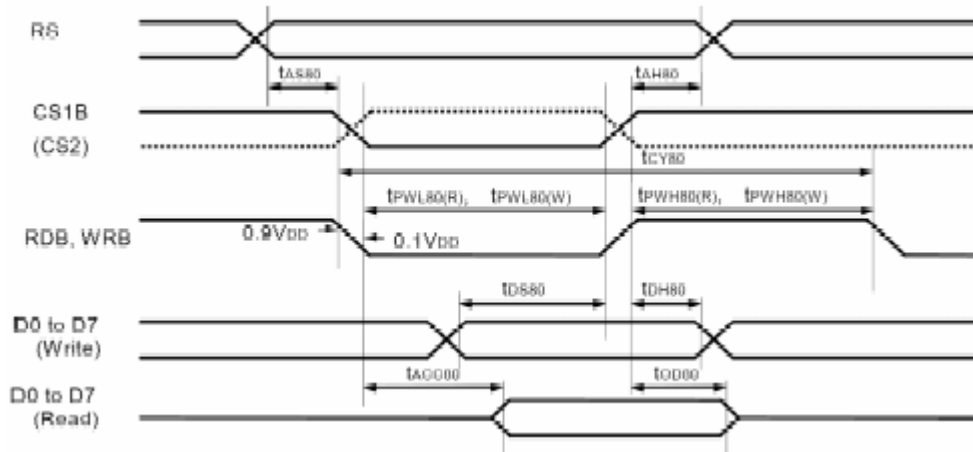
At $T_a=20$ To $+70$, $V_{DD}=3.0V, GND=0V$

Item	Signal	Symbol	Condition	Min	Max	Unit
Address setup time	RS	t_{AS80}		0		ns
Address hold time		t_{AH80}		0		
System cycle time (Write)		t_{CY80}		50		ns
Pulse width low for write	WRB (WRB)	$t_{PWL80(W)}$		20		ns
Pulse width high for write		$t_{PWH80(W)}$		20		
Pulse width low for read	RDB (RDB)	$t_{PWL80(R)}$		60		ns
Pulse width high for read		$t_{PWH80(R)}$		20		
Data setup time		t_{DS80}		5		ns
Data hold time		t_{DH80}		5		
Read access time	D0 to D7	t_{ACC80}	CL=100pF		80	ns
Output disable time		t_{OD80}	no load	20		

NOTE: The input signal rise time and fall time (t_r, t_f) is specified at 10 ns or less.

$(t_r + t_f) < (t_{CY80} - t_{PWL80}(W) - t_{PWH80}(W))$ for write,

$(t_r + t_f) < (t_{CY80} - t_{PWL80}(R) - t_{PWH80}(R))$ for read.

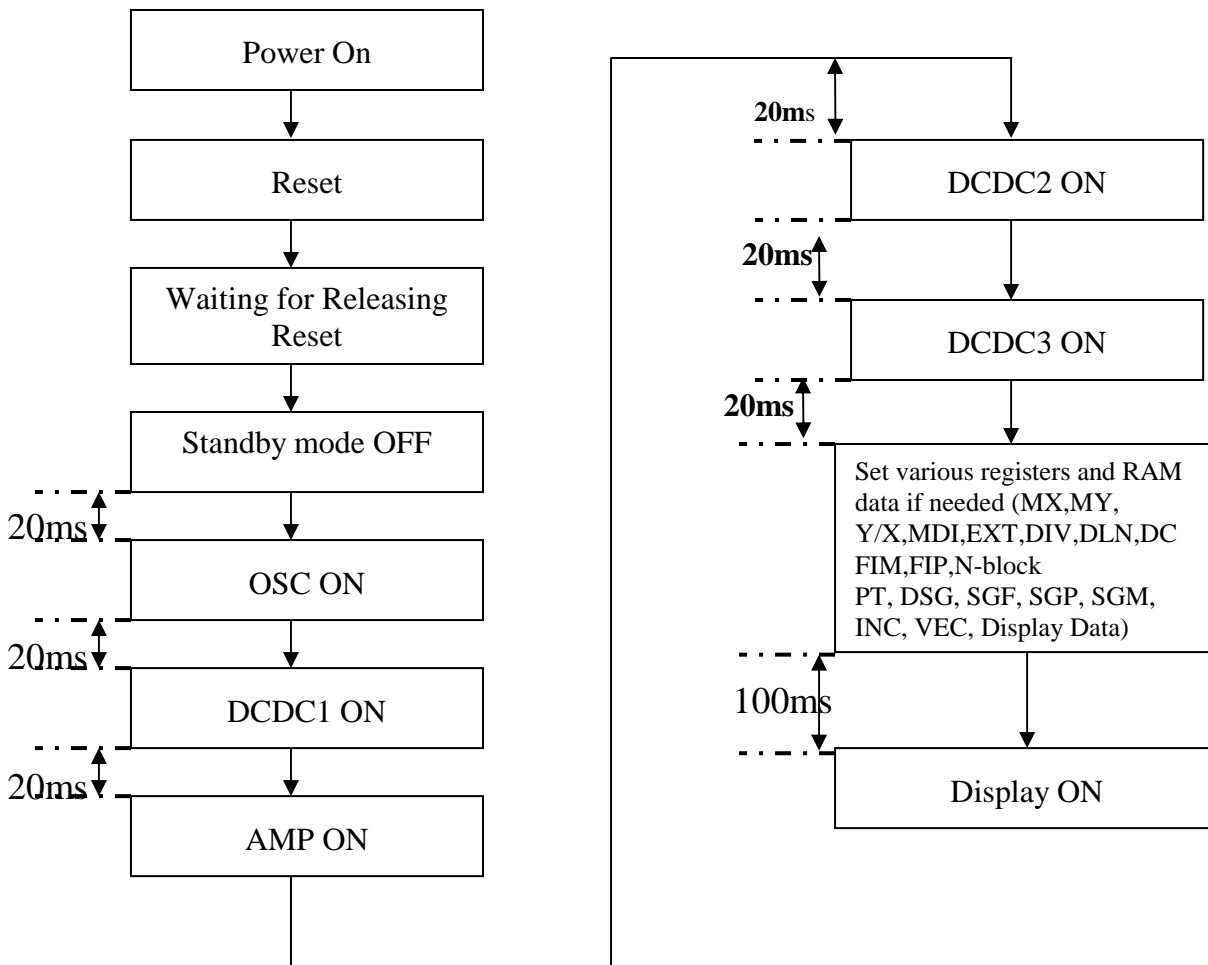


* $t_{PWL80}(W)$ -and $t_{PWH80}(R)$ is specified in the overlapped period when $CS1B$ is low ($CS2$ is high) And WRB (RDB) is low.

Figure 3: Parallel Interface (8080-series MPU) Timing Diagram.

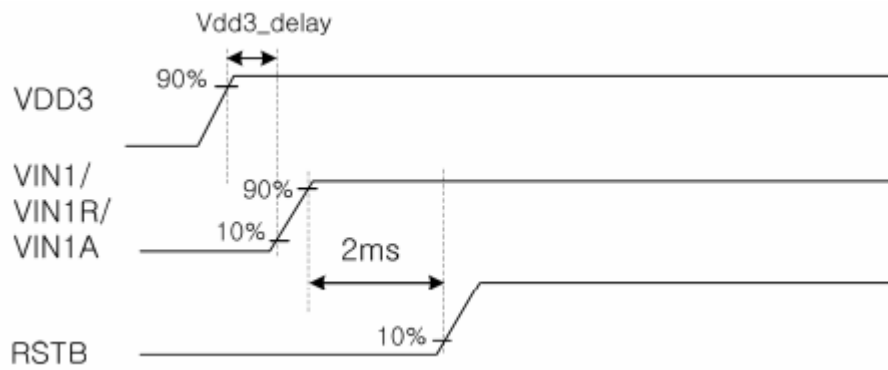
7. POWER ON/OFF SEQUENCE

1) Power On Sequence



2) Power Input Sequence Timing

a) With Internal Regulator

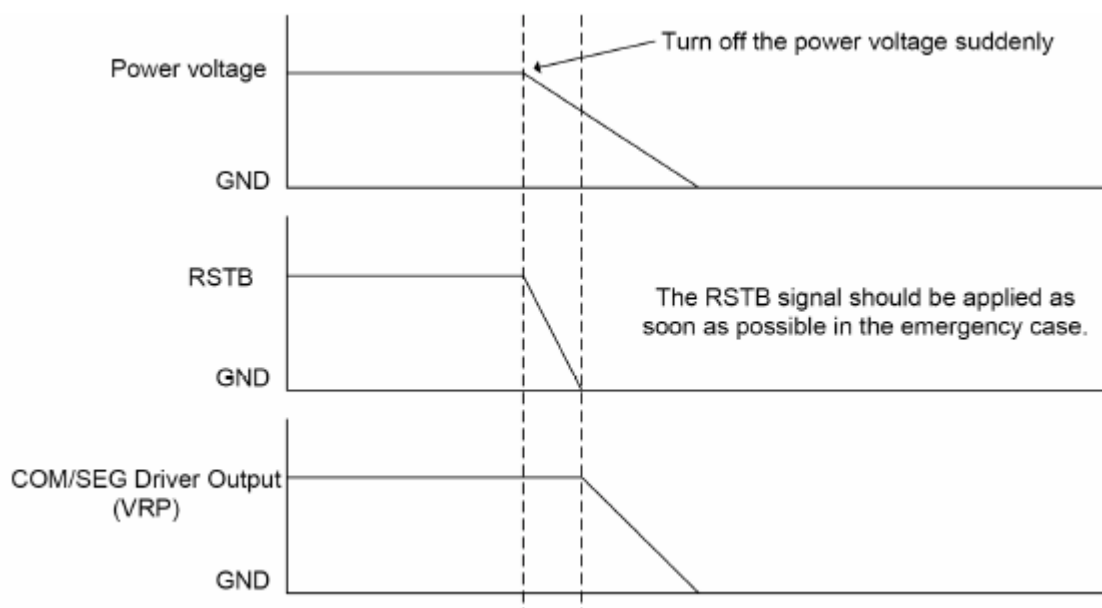
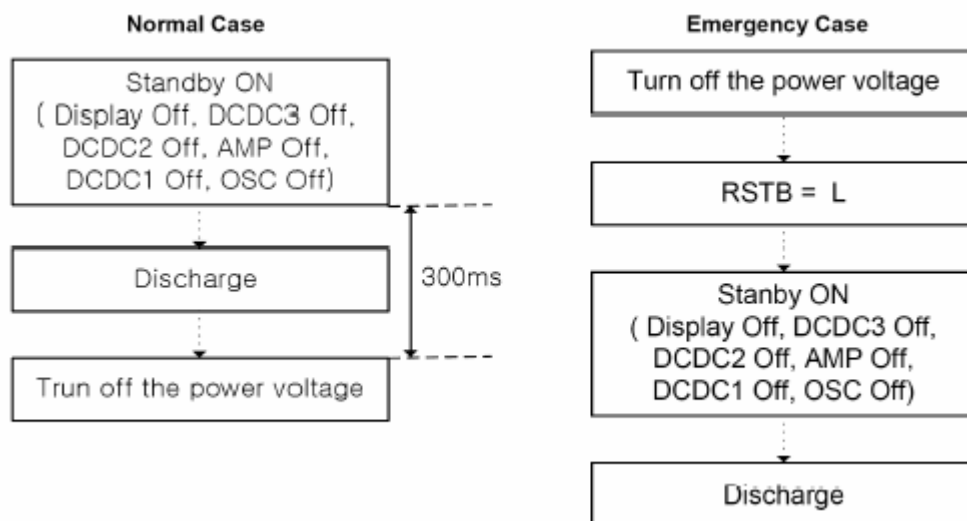


VDD3 must be applied earlier than VIN1/VIN1R/VIN1A or at least applied simultaneously with these signals. (ie: Min. of $V_{dd3_delay} \geq 0ms$)

When C1 with internal regulator, regulator application is 1Uf, RSTB must be applied after VIN1/VIN1R/VIN1A have been applied.

The applied time gap between VIN1/VIN1R/VIN1A and RSTB is minimum 2ms. As C1 becomes larger, this time gap must be increased. Otherwise function is not guaranteed.

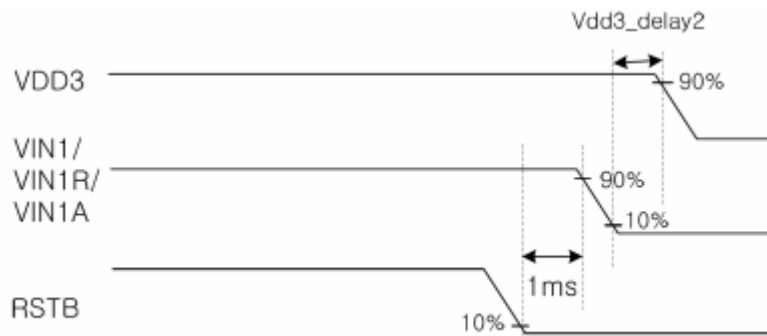
3) Power Off Sequence



Note: When the signal of the hardware reset comes during the power-off period, COM/SEG output is forcibly lowered to the GND levels.

4) Power Off Sequence Timing

a) With Internal Regulator



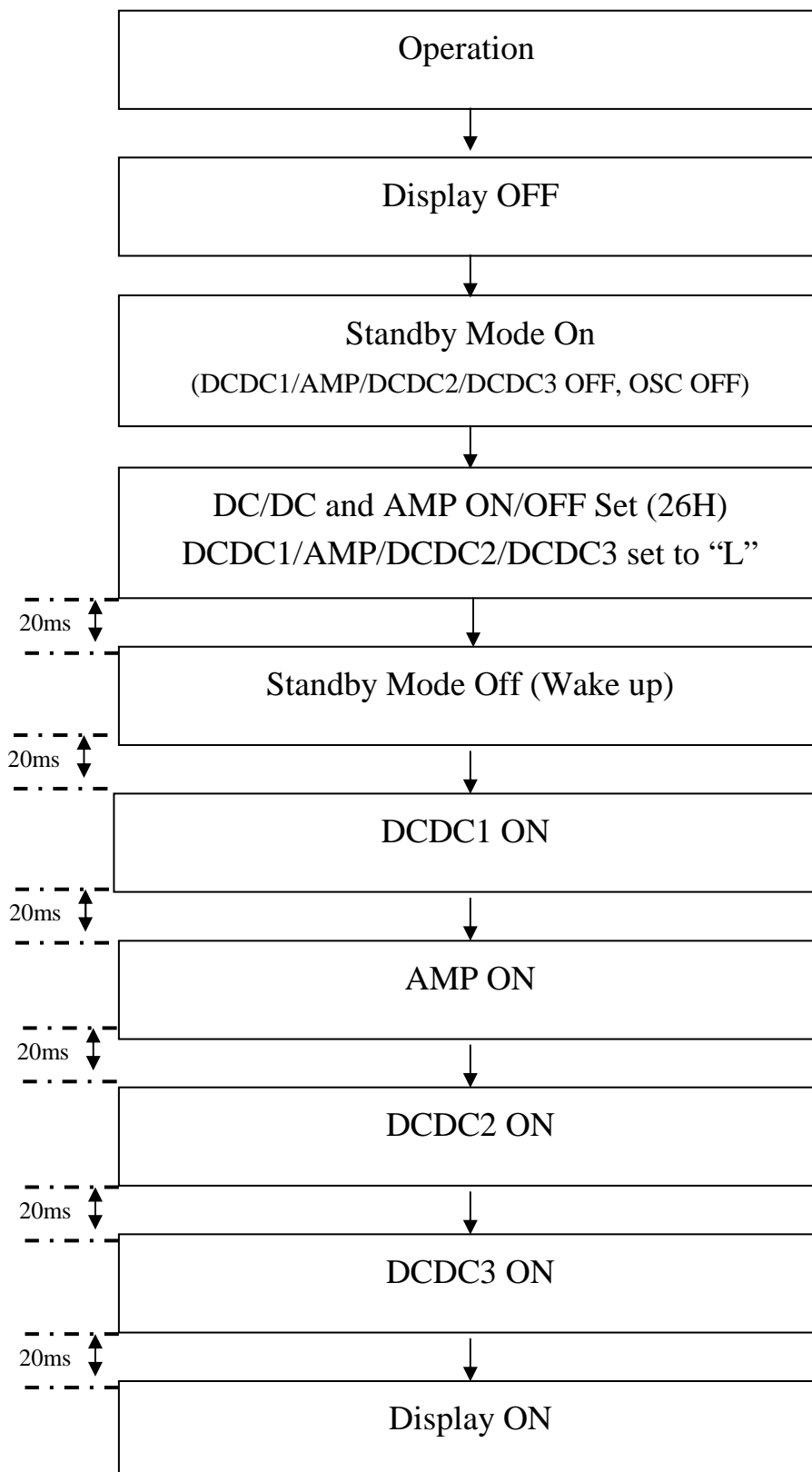
VDD3 must be powered down later than VIN1/VIN1R/VIN1A or at least powered down simultaneously with these signals. (ie: Min. of Vdd3_delay2 0ms)

VIN1/VIN1R/VIN1A must be powered down after RSTB have been powered down.

The time gap of powered down between RSTB and VIN1/VIN1R/VIN1A is minimum 1ms.

Otherwise function is not guaranteed.

5) Wake up Sequence



8. INTERFACE PIN CONNECTIONS

Pin NO.	Symbol	Description															
1	GND	Ground															
2	LCD_VDD	Power supply															
3	/LCD-CS	Chip select input pins. Data/Instruction I/O is enabled only when CS1B is "L".															
4	LCD_RS	Data/Instruction select input pin															
		<table border="1"> <thead> <tr> <th>RS</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>L</td> <td>D0 to D7 are instruction data</td> </tr> <tr> <td>H</td> <td>D0 to D15 are display data</td> </tr> </tbody> </table>	RS	Description	L	D0 to D7 are instruction data	H	D0 to D15 are display data									
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5	/LCD_WR	Read/Write execution control pin.															
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6	/LCD_RD	Read/Write execution control pin.															
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H	L	8080-sries	RD	Read enable clock input pin When RD is "L", data are in an output Status.													
7	D0	Data pin. (high 8 bits)															
8	D1																
9	D2																
10	D3																
11	D4																
12	D5																
13	D6																
14	D7																
15	D8	Data pin. (high 8 bits)															
16	D9																
17	D10																
18	D11																
19	D12																
20	D13																
21	D14																
22	D15																
23	/LCD_RES	Reset input pin. When RSTB is "L", initialization is executed.															
24	GND	Ground															
25	K	Cathode of backlight input.															
26	K																
27	VDD	Power supply															
28	IM0	Select the 8 or 16 bit bus, when IM0=L, D0~D7 is active,(D8~D15) must be When IM0=H, D0~D15 is active.															
29	A	Anode of back light input															
30	A																

9. RELIABILITY

- (1). LCD 's should be kept in sealed polyethylene bags while MDL's should use antistatic ones.
If properly sealed, there is no need for desiccant.
- (2).Store in dark places and do not expose to sunlight or fluorescent light. Keep the temperature between 0 and 35 and the relative humidity low. Please consult BONA for other storage requirements.
- (3). Water condensation will affect reliability performance of the display and is not allowed.
- (4). Semi-conductor device on the display is sensitive to light and should be protected properly.
- (5). Power up/down sequence:
 - a) Power Up: in general, LCD supply voltage, Vo must be supplied after logic voltage, VDD becomes steady. Please refer to related IC data sheet for details.
 - b) Power Down: in general, LCD supply voltage, Vo must be removed before logic voltage, VDD turns off. Please refer to related IC data sheet for details.

10. HANDLING CAUTIONS

1. Liquid Crystal Display (LCD)

LCD is made up of glass, organic sealant, organic fluid and polymer based polarizers. The following precautions should be taken when handling:

- (1). Keep the temperature within range for use and storage. Excessive temperature and humidity could cause polarization degradation, polarizer peel-off or bubble generation. When storage for a long period over 40 is required, the relative humidity should be kept below 60%.
- (2). Do not contact the exposed polarizers with anything harder than an HB pencil lead. To clean dust off the display surface, wipe gently with cotton, chamomile or other soft material soaked in petroleum benzene. Never scrub hard.
- (3). BONA does not responsible for any polarizer defect after the protective film has been removed from the display.
- (4). Wipe off saliva or water drops immediately. Contact with water over a long period of time may cause polarizer deformation or color fading, while an active LCD with water condensation on its surface will cause corrosion of ITO electrodes.
- (5). PETROLEUM BENZINE is recommended to remove adhesives used to attach front/rear polarizers and reflectors while chemicals like acetone, toluene, ethanol and isopropyl alcohol will cause damage to the polarizer. Avoid oil and fats. Avoid lacquer and epoxies which might contain solvents and hardeners to cause electrode erosion. Some solvents will also soften the epoxy covering the DIL pins and thereby weakening the adhesion of the epoxy on glass. This will cause the exposed electrodes to erode electrochemically when operating in high humidity and condensing environment.
- (6). Glass can be easily chipped or cracked from rough handling, especially at corners and edges.
- (7). Do not drive LCD with DC voltage.
- (8). When soldering DIL pins, avoid excessive heat and keep soldering temperature between 260 to 300 for no more than 5 seconds. Never use wave or reflow soldering.

2. Liquid Crystal Display Modules (LCD)

2.1 Mechanical Considerations

MDL'S ARE ASSEMBLED and adjusted with a high degree of precision. Avoid excessive shocks and do not make any alterations or modifications. The following should be noted.

- (1). Do not tamper in any way with the tabs on the metal frame.
- (2). Do not modify the PCB by drilling extra holes. Changing its outline, moving its components or modifying its pattern.

- (3). Do not touch the elastomer connector (conductive rubber), especially when inserting an EL panel.
- (4). When mounting a MDL make sure that the PCB is not under any stress such as bending or twisting. Elastomer contacts are very delicate and missing pixels could result from slight dislocation of any of the elements.
- (5). Avoid pressing on the metal bezel, otherwise the elastomer connector could be deformed and lose contact, resulting in missing pixels.
- (6). If FPCA need to be bent, please refer the suggested bending area on the specification. The stiffener and component area on FPC/FFC/COF must not be bent during or after assembly (Note: for those models with FPC/FFC/COF+stiffener)
- (7). Sharp bending should be avoided on FPC to prevent track cracking

2.2 Static Electricity

MDL contains CMOS LST's and the same precaution for such devices should apply, namely:

- (1).The operator should be grounded whenever he comes into contact with the module, Never touch any of the conductive parts such as the LSI pads, the copper leads on the PCB and the interface terminals with any part of the human body.
- (2).The modules should be kept in antistatic bags or other containers resistant to static for storage.
- (3).Only properly grounded soldering irons should be used.
- (4). If an electric screwdriver is used it should be well grounded and shielded from commutator sparks.
- (5).The normal static prevention measures should be observed for work clothes and working benches, for the latter conductive (rubber) mat is recommended.
- (6).Since dry air is inductive to statics. A relative humidity of 50~60% is recommended.

2-3. Soldering

- (1). Solder only to the I/O terminals.
- (2). Use only soldering irons with proper grounding and no leakage.
- (3). Soldering temperature is 280 ±10 .
- (4). Soldering time: 3 to 4 seconds.
- (5). Use eutectic solder with resin flux fill.
- (6). If flux is used. The LCD surface should be covered to avoid flux spatters. Flux residue should be removed afterwards.

- (7). Use proper de-soldering methods (e.g suction type desoldering irons) to remove lead wires from the I/O terminals when necessary. Do not repeat the soldering/desoldering process more than three times as the pads and plated through holes may be damaged.

2-4. Label

Identification labels will be stuck on the module without obstructing the viewing area of display.

3. Operation

- (1). The viewing angle can be adjusted by varying the LCD driving voltage V_o .
- (2). Driving voltage should be kept within specified range, excess voltage shortens display life.
- (3). Response time increases with decrease in temperature.
- (4). Display may turn black or dark blue at temperatures destructive and the display will return to normal once the temperature falls back to range.
- (5). Mechanical disturbance during operation (such as pressing on the viewing area) may cause the segments to appear “fractured”, They will recover once the display is turned off.
- (6). Condensation at terminals will cause malfunction and possible electrochemical reaction. Relative humidity of the environment should therefore be kept below 60%.
- (7). Display performance may vary out of viewing area. If there is any special requirement on performance out of viewing area, please consult BONA

4. Safety

If any fluid leaks out of a damaged glass cell, wash off any human part that comes into contact with soap and water, Never swallow the fluid, The toxicity is extremely low but caution should be exercised at all times.

LIMITED WARRANTY

BONA LCDs and modules are not consumer products, but may be incorporated by BONA’s customers into consumer products or component thereof. BONA does not, warrant that is LCDs and components are fit for any such particular purpose.

1. The liability of BONA is limited to repair or replacement on the terms set forth below. BONA will not be responsible for any subsequent or consequential events or injury or damage to any personnel or user including third party personnel and/or user.

Unless otherwise agreed in writing between BONA and the customer, BONA will only replace or repair any of its LCD which is found defective electrically or visually when inspected in accordance with BONA LCD Acceptance Standards (copies available on request), for a period of

one year from the date of shipment. Confirmation of such date shall be based on freight documents.

2. No warranty can be granted if any of the precautions stated in HANDLING LCE and LCD Modules above have been disregarded. Broken glass, scratches on polarizers, mechanical damages as well as defects that are caused by accelerated environmental tests are excluded from warranty.
3. In returning the LCD and Modules, they must be properly packaged and there should be a detailed description of the failures or defects.

IMPORTANT NOTICE

The information presented in this document has been carefully checked and is believed to be accurate, however, no responsibility is assumed for inaccuracies. BONA reserves the right to make changes to any specifications without further notice for performance, reliability, production technique and other considerations, BONA does not assume any liability arising out of the application or use of products herein. Please see Limited Warranty in the previous section.

11. LCD COSMETIC CONDITIONS

1. Reference document follows ISS-001.

In the project please also follow as below: (First grade: Without any cosmetic defect and functional defect. The uniformity is perfect and the background is same as to golden sample.)

2. LCD size of the product is small.

12. PACKING

TBD