Bolymin, Inc.

LCD MODULE SPECIFICATION

MODEL NO.

BF128128E series

FOR MESSRS:

_____

ON DATE OF:

_____

APPROVED BY:

_____

C O N T E N T S

RECORDS OF REVISION				SPEC.NO.	
DATE	REVISED NO.	REF. PAGE	SUMMARY	DESIGN	CHECK
03/09/04	0		First issue	CEN.LIU	TOM.LI

1. Numbering System

	B	F	128128	E	F	P	N	_	H	xxx
	0	1	2	3	4	5	6	7	8	9

0	Brand		Bolymin	
1	Module Type		C= character type G= graphic type P= TAB/TCP type	O= COG type F= COF type
2	Format		2002=20 characters, 4 lines 12232= 122 x 32 dots	
3	Version No.		A type	
4	LCD Color		G=STN/gray Y=STN/yellow-green C=color STN	B=STN/blue F=FSTN T=TN
5	LCD Type		R=positive/reflective P=positive/transflective	M=positive/transmissive N=negative/transmissive
6	Backlight type/color		L=LED array/ yellow-green H=LED edge/white R=LED array/red G=LED edge/yellow-green	D=LED edge/blue E=EL/white B=EL/blue C=CCFL/white N=No backlight
7	CGRAM Font (applied only on character type)		J=English/Japanese Font E=English/European Font	C=English/Cyrillic Font H=English/Hebrew Font
8	View Angle/ Operating Temperature		B=Bottom/Normal Temperature H=Bottom/Wide Temperature U=Bottom/Ultra wide Temperature	T=Top/Normal Temperature W=Top/Wide Temperature C=9H/Normal Temperature
9	Special Code		3=3 volt logic power supply n=negative voltage for LCD c=cable/connector xxx=to be assigned on data sheet	t=temperature compensation for LCD p=touch panel

2. General Specification

(1) Mechanical Dimension

Item	Standard Value	Unit
Number of dots	128X128	dots
Module dimension (L*W*H)	83.5*36.3*1.4(Max)	mm
View area	30.5(W)X32.0(H)	mm
Active area	27.25(W)X29.81(H)	mm
Dot size	0.199(W)X0.219(H)	mm
Dot pitch	0.213(W)X0.233(H)	mm

(2) Features *Controller:HD66750 COF package

*Display type:FSTN,transflective,positive,6H view.

*2.8V singal power input

*Built in temperature compensation circuit

(3) Temperature Range

	Normal	Wide
Operating	0 ~+50℃	-20 ~ +70℃
Storage	-10 ~ +60℃	-30 ~ +80℃

3. Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	TOP	-20	—	+70	℃
Storage Temperature	TST	-30	—	+80	℃
Input Voltage	VI	0	—	$V_{CC+0.3}$	V
Supply Voltage For Logic	VDD-VSS	0	—	4.6	V
Supply Voltage For LCD	Vlcd-VSS	0	—	20	V

4. Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply Voltage For Logic	V_{DD}-V_{SS}	—	2.4	2.8	3.6	V
Supply Voltage For LCD	Vlcd	Ta=-20℃ Ta=25℃ Ta=+70℃	— — —	13.5 12.8 12.1	— — —	V V V
Input High Vol	V_{IH}	—	0.7V_{DD}	—	V_{DD}	V
Input Low Vol	V_{IL}	—	0	—	0.15V_{DD}	V
Supply Current	I_{DD}	V_{DD}=2.8V	—	0.2	0.4	mA

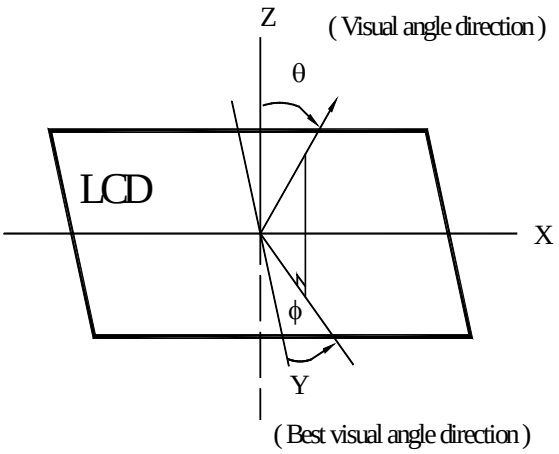
5. Optical Characteristics

FSTN

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
View Angle	(V) θ	CR≧3	10		60	deg
	(H) ϕ	CR≧3	-45		45	deg
Contrast Ratio	CR	—		7		—
Response Time 25℃	T rise	—		200	250	ms
	T fall	—		200	250	ms

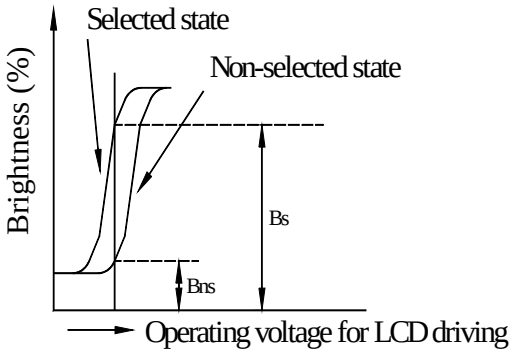
5.1 Definitions

■View Angles

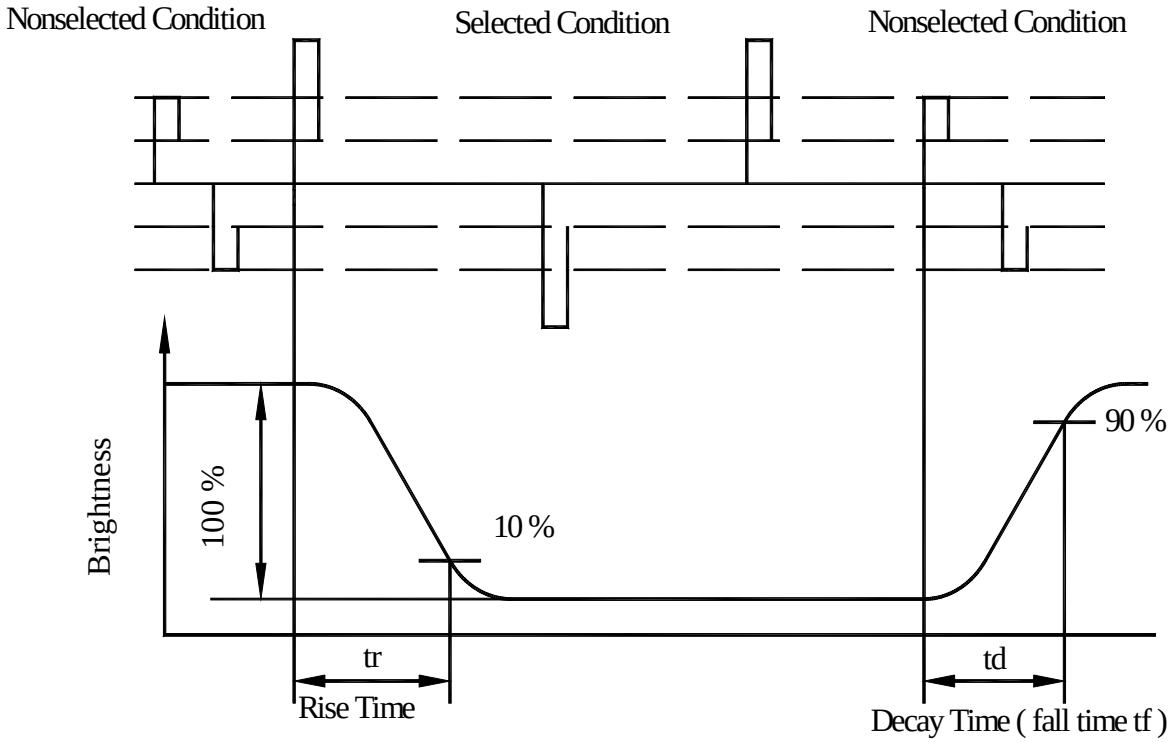


■Contrast Ratio

$$CR = \frac{\text{Brightness at selected state (BS)}}{\text{Brightness at non-selected state (Bns)}}$$



■Response time



6. Interface Pin Function and software setting

Pin No.	Symbol	Level	Description
1	VDD	2.8V	Power supply for logic
2~9	D7~D0	H/L	Data bus 7~0
10	/RESET	H/L	Reset pin ,active L
11	/CS	H/L	Chip Select signal
12	A0	H/L	Register select ,H:control L:index/status
13	/WR	H/L	Data write
14	/RD	H/L	Data read
15	VSS	0V	Ground

Software setting

Please must follow the blow setting. Otherwise the temp consumption circuit can't work very well. These setting are related to temp consumption circuit, especially in Power control.

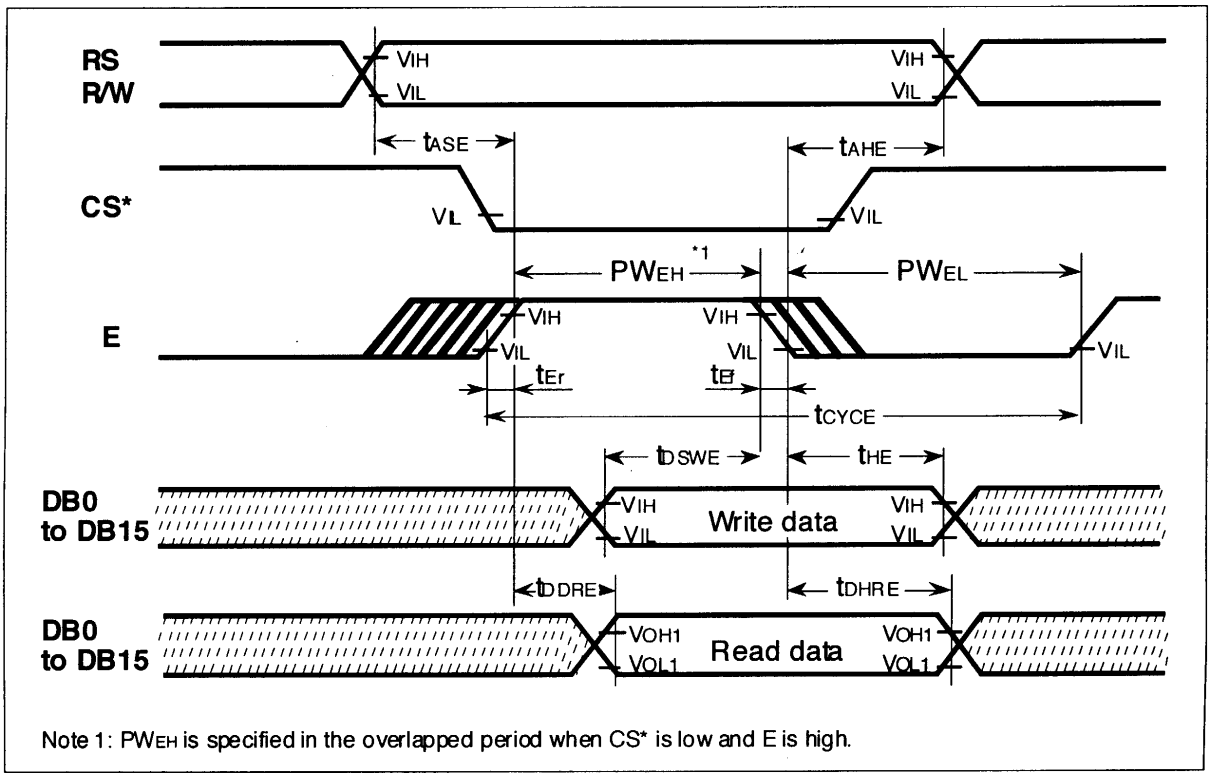
Power control

R/W	RS	DB15	DB14	DB13	DB12	DB11	DB10	DB9	DB8	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	1	*	*	*	BS2	BS1	BS0	BT1	BT0	*	*	DC1	DC0	AP1	AP0	SLP	STB
0	1	0	0	0	0	0	1	1	1	0	0	1	1	0	1	0	0
					1/10 BIAS			7-TIMES				4-DIVIDED		SMALL			

Contrast control

R/W	RS	DB15	DB14	DB13	DB12	DB11	DB10	DB9	DB8	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	1	*	*	*	*	*	*	*	*	*	*	CT5	CT4	CT3	CT2	CT1	CT0
0	1	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
												28 (HEX) , 40 (DEC)					

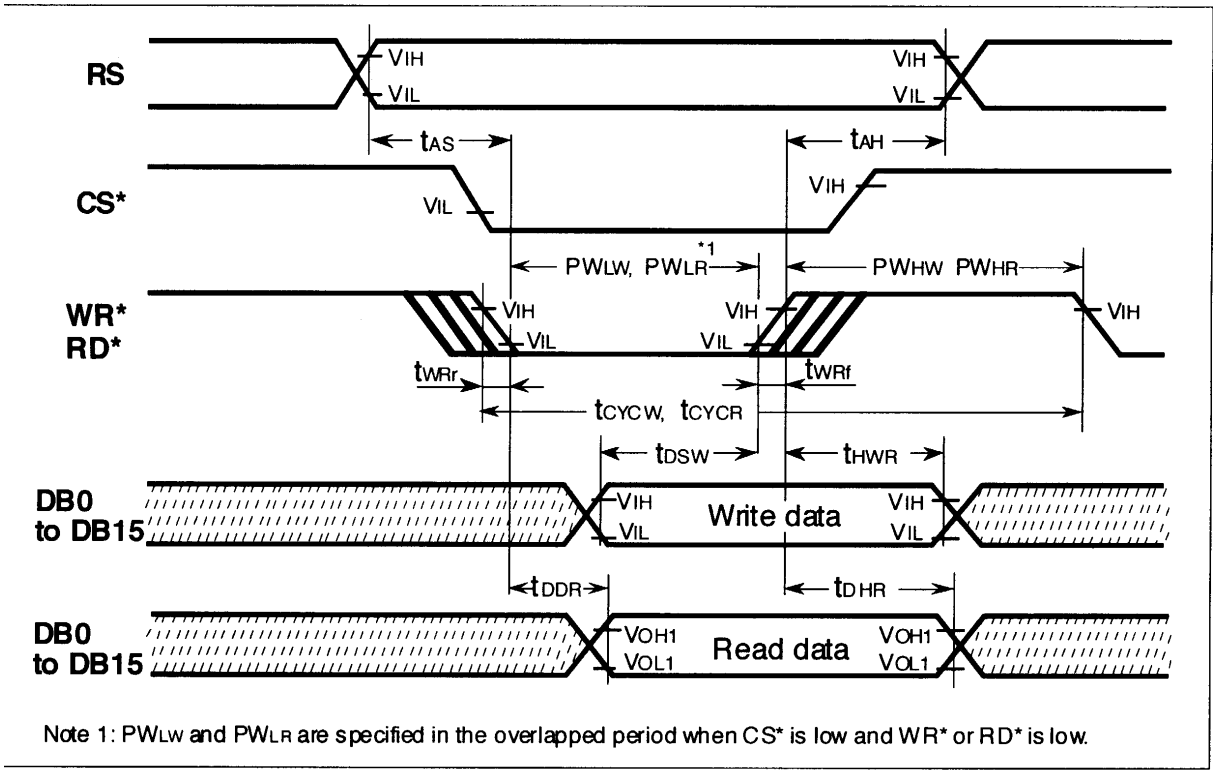
TIMING CHARACTERISTICS



Note 1: PWEH is specified in the overlapped period when CS* is low and E is high.

80-SYSTEM

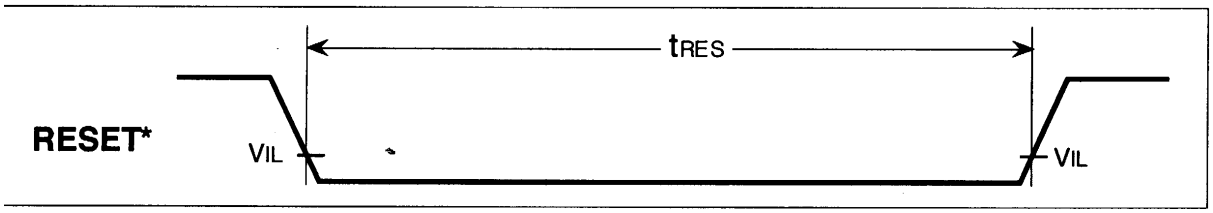
Item	Symbol	VDD=1.8to2.4V		VDD=2.4to3.6V		Unit
		Min	Max	Min	Max	ns
Bus cycle time	tcycW	**Write** 600	--	380	--	
	tcycR	**Read** 800		500		
Lo level plusw width	PWLW	**Write**120	--	70	--	
	PWLR	**Read** 350		250		
Hi-level pulse width	PWHW	**Write**300	--	150	--	
	PWHRL	**Read** 300		150		
Enable rise/fall time	tWRr,WRf	--	25	--	25	
Address set-up time (RS, R/W to E)	tAS	50	--	50	--	
Address hold time	tAH	20	--	20	--	
Write Data set-up time	tDSW	60	--	60	--	
Write Data hold time	tH	20	--	20	--	
Read Data delay time	tDDR	--	300	--	200	
Read Data hold time	tDHR	5	--	5	--	



Note 1: PWLW and PWLR are specified in the overlapped period when CS* is low and WR* or RD* is low.

Figure 63 80-system Bus Timing

Reset Operation



7. Quality Assurance

◆ Screen Cosmetic Criteria

No.	Defect	Judgement Criterion	Partition
1	Spots	A)Clear Size:d mm — Acceptable Qty in active area d ≦0.1 — Disregard 0.1<d≦0.2 — 6 0.2<d≦0.3 — 2 0.3<d — 0 Note:Including pin holes and defective dots which must be within one pixel size. B)Unclear Size:d mm — Acceptable Qty in active area d ≦0.2 — Disregard 0.2<d≦0.5 — 6 0.5<d≦0.7 — 2 0.7<d — 0	Minor
2	Bubbles in Polarizer	Size:d mm — Acceptable Qty in active area d≦0.3 — Disregard 0.3<d≦1.0 — 3 1.0<d≦1.5 — 1 1.5<d — 0	Minor
3	Scratch	In accordance with spots cosmetic criteria. When the light reflects on the panel surface, the scratches are not to be remarkable.	Minor
4	Allowable Density	Above defects should be separated more than 30mm each other.	Minor
5	Coloration	Not to be noticeable coloration in the viewing area of the LCD panels. Back-light type should be judged with back-light on state only.	Minor

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8. Reliability

■Content of Reliability Test

Environmental Test				
No.	Test Item	Content of Test	Test Condition	Applicable Standard
1	High Temperature storage	Endurance test applying the high storage temperature for a long time.	60℃ 200hrs	——
2	Low Temperature storage	Endurance test applying the high storage temperature for a long time.	-10℃ 200hrs	——
3	High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	50℃ 200hrs	——
4	Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	0℃ 200hrs	——
5	High Temperature/ Humidity Storage	Endurance test applying the high temperature and high humidity storage for a long time.	70℃,90%RH 96hrs	——
6	High Temperature/ Humidity Operation	Endurance test applying the electric stress (Voltage & Current) and temperature / humidity stress to the element for a long time.	40℃,90%RH 96hrs	——
7	Temperature Cycle	Endurance test applying the low and high temperature cycle. -10℃ 25℃ 60℃ 30min 5min 30min 1 cycle	-10℃/60℃ 10 cycles	——
Mechanical Test				
8	Vibration test	Endurance test applying the vibration during transportation and using.	10~22Hz→1.5mmp-p 22~500Hz→1.5G Total 0.5hrs	——
9	Shock test	Constructional and mechanical endurance test applying the shock during transportation.	50G Half sign wave 11 msedc 3 times of each direction	——
10	Atmospheric pressure test	Endurance test applying the atmospheric pressure during transportation by air.	115mbar 40hrs	——
Others				
11	Static electricity test	Endurance test applying the electric stress to the terminal.	VS=800V,RS=1.5kΩ CS=100pF 1 time	——

***Supply voltage for logic system=5V. Supply voltage for LCD system = Operating voltage at 25℃

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.

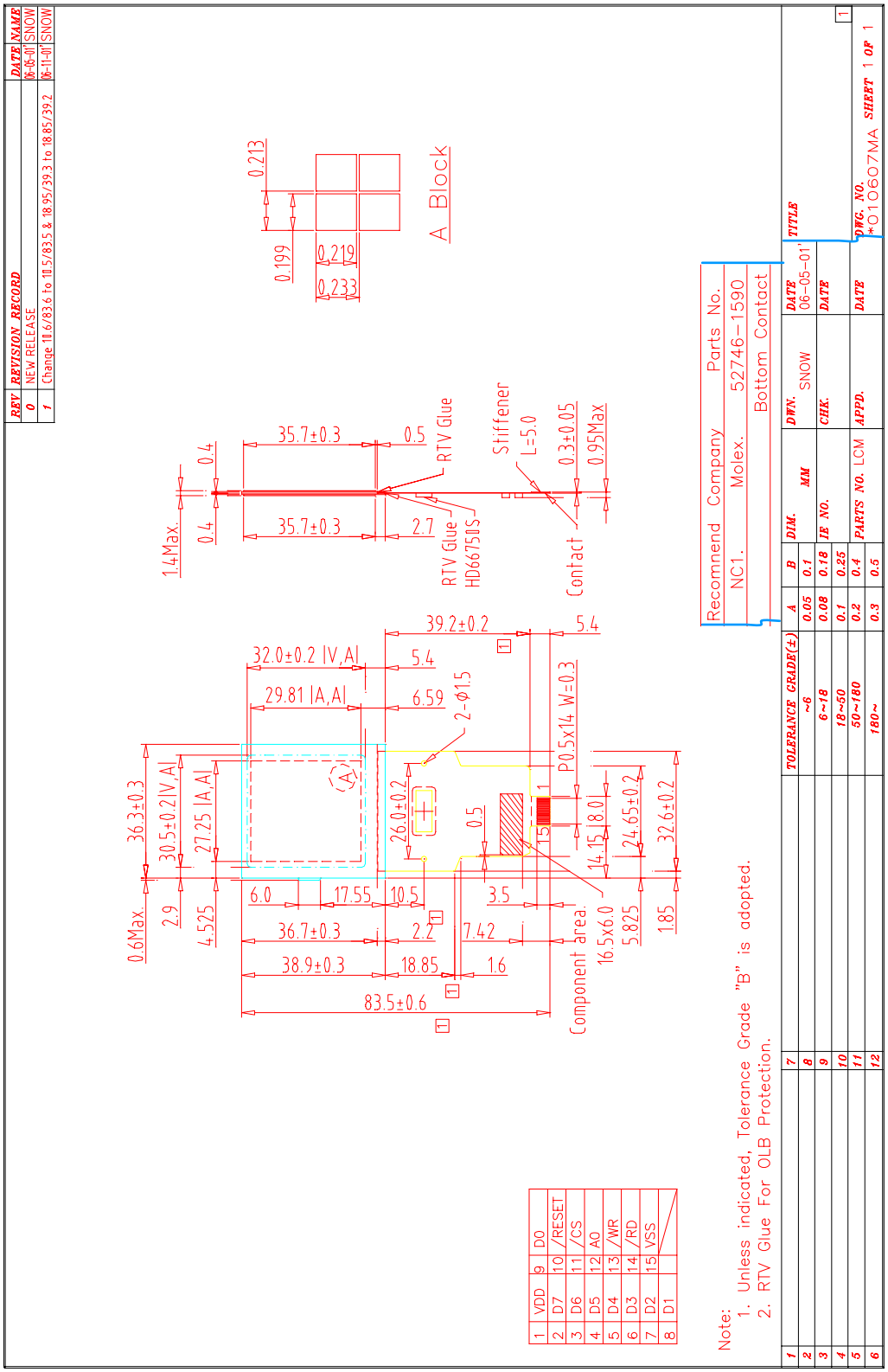
(7) In the event of LCD breakage and resultant leakage of fluid do not inhale, ingest or make contact with the skin. If contact is made rinse immediately.

(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.

10 OUTLINE DIMENSION



BLOCK DIAGRAM