



LCD MODULE SPECIFICATION

MODEL NO.

BO12864B series

FOR MESSRS:

ON DATE OF:

APPROVED BY:



RECORD OF REVISION

Revision Date	Section	Contents
2005/3/7	-	New Release



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1. Numbering System

<u>B</u>	<u>Q</u>	<u>12864</u>	<u>B</u>	<u>F</u>	<u>P</u>	<u>H</u>		<u>H</u>	<u>xxx</u>
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
7	CGRAM Font	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 supply n=negative voltage LCD c=cable/connector xxx=to be assigned on data sheet t=temperature compensation for LCD p=touch panel	



2. Precaution in use of LCD Module

1. To avoid applying excessive shocks to the module or making any alterations or modifications to it.
2. Don't make extra holes on the printed circuit board, modify its shape or change the components of LCD module.
3. Don't disassemble the LCM.
4. Don't operate it above the absolute maximum rating.
5. Don't drop, bend or twist LCM.
6. Soldering: only to the I/O terminals.
7. Storage: please storage in anti-static electricity container and clean environment.
8. Don't touch the elastmer connector, especially insert a backlight panel (EL or CCFL)

3. General Features

This BO12864B is a dot matrix graphic LCD module fabricated by low power COMS technology, interfaced with 8 –bit MPU.

Features

- Display format: 128dots* 64dots
- STN Grey mode
- Easy interface with 8-bit MPU
- Low power consumption
- Transflective (low)light method
- Viewing angle:6 o'clock
- Multiplex level: 1/64duty, 1/9bias
- LCD driver IC :SED1565
- Connector: COG+FPC
- Power supply:2.7~5.5V
- Backlight: LED edge / Yellow Green



4. Mechanical Specifications

Item	Dimension	Unit
Module Size(W*H*T)	72.0X47.0X5.0(LED b/l)	mm
Viewing Area (W*H)	68.0*36.0	mm
Dot Pitch (W*H)	0.5*0.5	mm
Dot Size (W*H)	0.47*0.47	mm
Active Area (W*H)	63.97*31.97	mm
Number of Dots	128*64	mm

5. Temperature Characteristics

Parameter	Symbol	Rating	Unit
Operating	Top	-20-60	°C
Storage temperature	Tst	-30-70	°C

6. Electro-Optical characteristics

STN Type (super TN)

Item	Sym	Condition	Min.	Typ.	Max.	Unit
Contrast	CR	$\theta=0^\circ$ $\Phi=0^\circ$	3 : 1	—	—	deg.
Viewing Angle	θ	K=5 $\Phi=0^\circ$	$\theta_2 - \theta_1=30$	—	—	deg.
		K=5 $\theta=10^\circ$	$\Phi= \pm 30$	—	—	deg.
Response time	T _{on}	25°C	—	—	250	ms
	T _{off}	25°C	—	—	250	ms

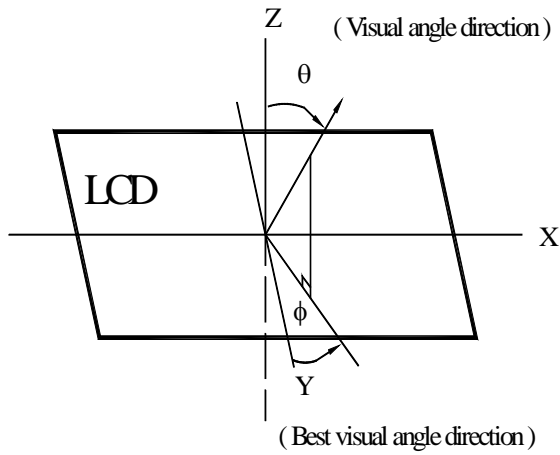
FSTN Type

Item	Sym	Condition	Min.	Typ.	Max.	Unit
Contrast	CR	$\theta=0^\circ$ $\Phi=0^\circ$	5 : 1	—	—	deg.
Viewing Angle	θ	K=5 $\Phi=0^\circ$	$\theta_2 - \theta_1=45$	—	—	deg.
		K=5 $\theta=10^\circ$	$\Phi= \pm 45$	—	—	deg.
Response time	T _{on}	25°C	—	—	250	ms
	T _{off}	25°C	—	—	250	ms

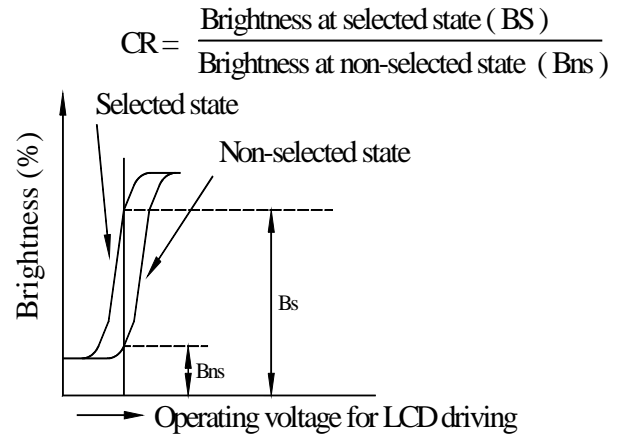


6.1 Definitions

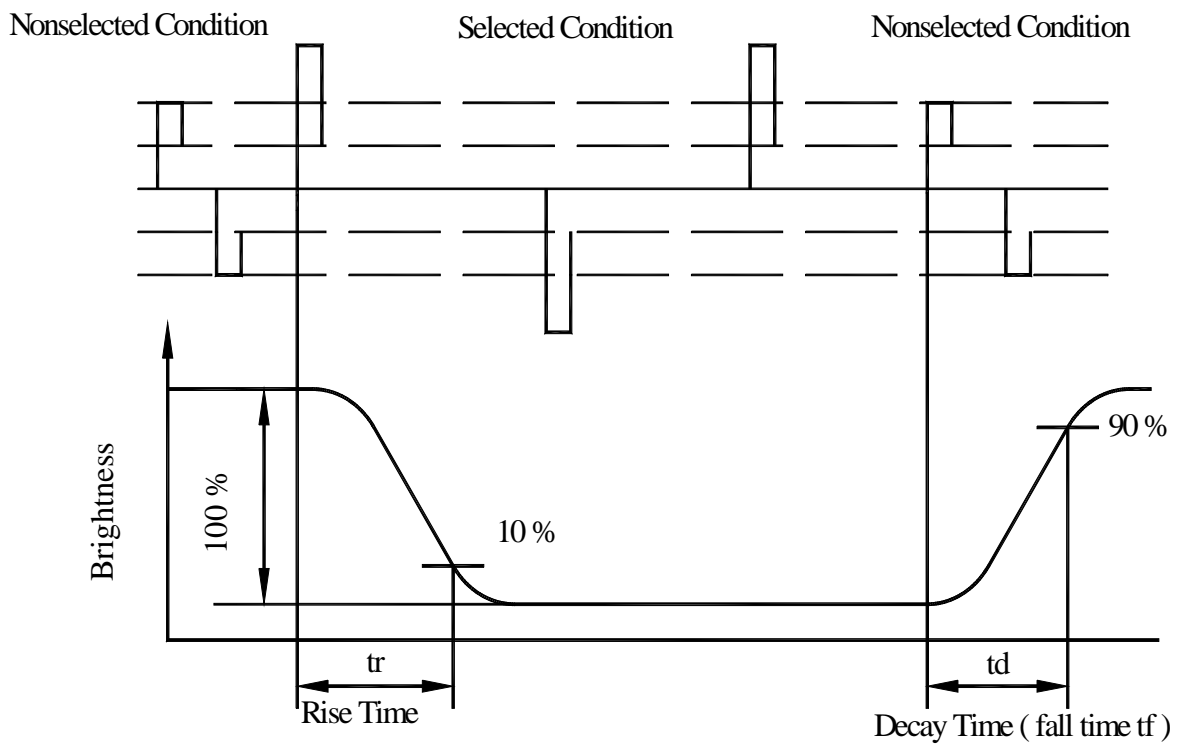
■ View Angles



■ Contrast Ratio



■ Response time





7. Interface Pin Function

Pin No.	Symbol	Level	Description
1	C86	H/L	H: 6800 series MPU; L:8080 series MPU
2	V _{ss}	0V	GND
3~7	V ₅ ~V ₁		Multi level power supply for LCD V _{dd} (=V _o) ≥ V ₁ ≥ V ₂ ≥ V ₃ ≥ V ₄ ≥ V ₅
8~12	CAP2+,CAP- CAP1-,CAP1+ CAP3-		DC/DC voltage converter
13	V _{out}	H/L	DC/DC voltage converter output
14	V _{ss}	0V	GND
15	V _{dd}	5V	Power supply for logic
16~23	D7~D0	H/L	Data bus line 7~0
24	/RD(E)	H/L	Read signal(80 series MPU), Enable signal (6B series)
25	/WR(R/W)	H/L	Write signal(80 series MPU), R/W signal(68 series)
26	A0	H/L	H:D0~D7 are display data ; L:D0~D7 are command data
27	/RES	H/L	Resetting signal
28	/CS1	H/L	Chip select signal



8. Backlight information

(1)LED yellow green edge

Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Supply Current	I _{LED}	—	100		mA	V=4.0V
Supply Voltage	V	—	3.9	4.0	V	
Reverse Voltage	V _R	—	—	8	V	
Luminous Intensity	I _V	30	—	—	cd/m ²	I _{LED} =100mA
Wave Length	λ _p		574		nm	I _{LED} =100mA
Life Time		—	100000	—	Hr.	V ≤ 4.0V
Color	Yellow Green					

(2)LED white edge

Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Supply Current	I _{LED}	—	60		mA	V=3.1V
Supply Voltage	V	2.9	3.1	3.2	V	
Reverse Voltage	V _R	—	—	8	V	
Luminous Intensity	I _V	80	—	—	cd/m ²	I _{LED} =60mA
Wave Length	λ _p				nm	I _{LED} =60mA
Life Time		—	20000	—	Hr.	V ≤ 3.2V
Color	White					



(3)LED blue edge

Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Supply Current	I _{LED}	—	60		mA	V=3.3V
Supply Voltage	V	3.1	3.3	3.4	V	
Reverse Voltage	V _R	—	—	8	V	
Luminous Intensity	I _V	30	—	—	cd/m ²	I _{LED} =60mA
Wave Length	λ _p				nm	I _{LED} =60mA
Life Time		—	50000	—	Hr.	V ≤ 3.4V
Color	BLUE					



9. Quality Assurance

◆ Screen Cosmetic Criteria

No.	Defect	Judgement Criterion	Partition																				
1	Spots	<p>A) Clear</p> <table border="1"> <thead> <tr> <th>Size:d mm</th> <th>Acceptable Qty in active area</th> </tr> </thead> <tbody> <tr> <td>$d \leq 0.1$</td> <td>Disregard</td> </tr> <tr> <td>$0.1 < d \leq 0.2$</td> <td>6</td> </tr> <tr> <td>$0.2 < d \leq 0.3$</td> <td>2</td> </tr> <tr> <td>$0.3 < d$</td> <td>0</td> </tr> </tbody> </table> <p>Note: Including pin holes and defective dots which must be within one pixel size.</p> <p>B) Unclear</p> <table border="1"> <thead> <tr> <th>Size:d mm</th> <th>Acceptable Qty in active area</th> </tr> </thead> <tbody> <tr> <td>$d \leq 0.2$</td> <td>Disregard</td> </tr> <tr> <td>$0.2 < d \leq 0.5$</td> <td>6</td> </tr> <tr> <td>$0.5 < d \leq 0.7$</td> <td>2</td> </tr> <tr> <td>$0.7 < d$</td> <td>0</td> </tr> </tbody> </table>	Size:d mm	Acceptable Qty in active area	$d \leq 0.1$	Disregard	$0.1 < d \leq 0.2$	6	$0.2 < d \leq 0.3$	2	$0.3 < d$	0	Size:d mm	Acceptable Qty in active area	$d \leq 0.2$	Disregard	$0.2 < d \leq 0.5$	6	$0.5 < d \leq 0.7$	2	$0.7 < d$	0	Minor
Size:d mm	Acceptable Qty in active area																						
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$0.1 < d \leq 0.2$	6																						
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$0.2 < d \leq 0.5$	6																						
$0.5 < d \leq 0.7$	2																						
$0.7 < d$	0																						
2	Bubbles in Polarizer	<table border="1"> <thead> <tr> <th>Size:d mm</th> <th>Acceptable Qty in active area</th> </tr> </thead> <tbody> <tr> <td>$d \leq 0.3$</td> <td>Disregard</td> </tr> <tr> <td>$0.3 < d \leq 1.0$</td> <td>3</td> </tr> <tr> <td>$1.0 < d \leq 1.5$</td> <td>1</td> </tr> <tr> <td>$1.5 < d$</td> <td>0</td> </tr> </tbody> </table>	Size:d mm	Acceptable Qty in active area	$d \leq 0.3$	Disregard	$0.3 < d \leq 1.0$	3	$1.0 < d \leq 1.5$	1	$1.5 < d$	0	Minor										
Size:d mm	Acceptable Qty in active area																						
$d \leq 0.3$	Disregard																						
$0.3 < d \leq 1.0$	3																						
$1.0 < d \leq 1.5$	1																						
$1.5 < d$	0																						
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																				



10. Reliability

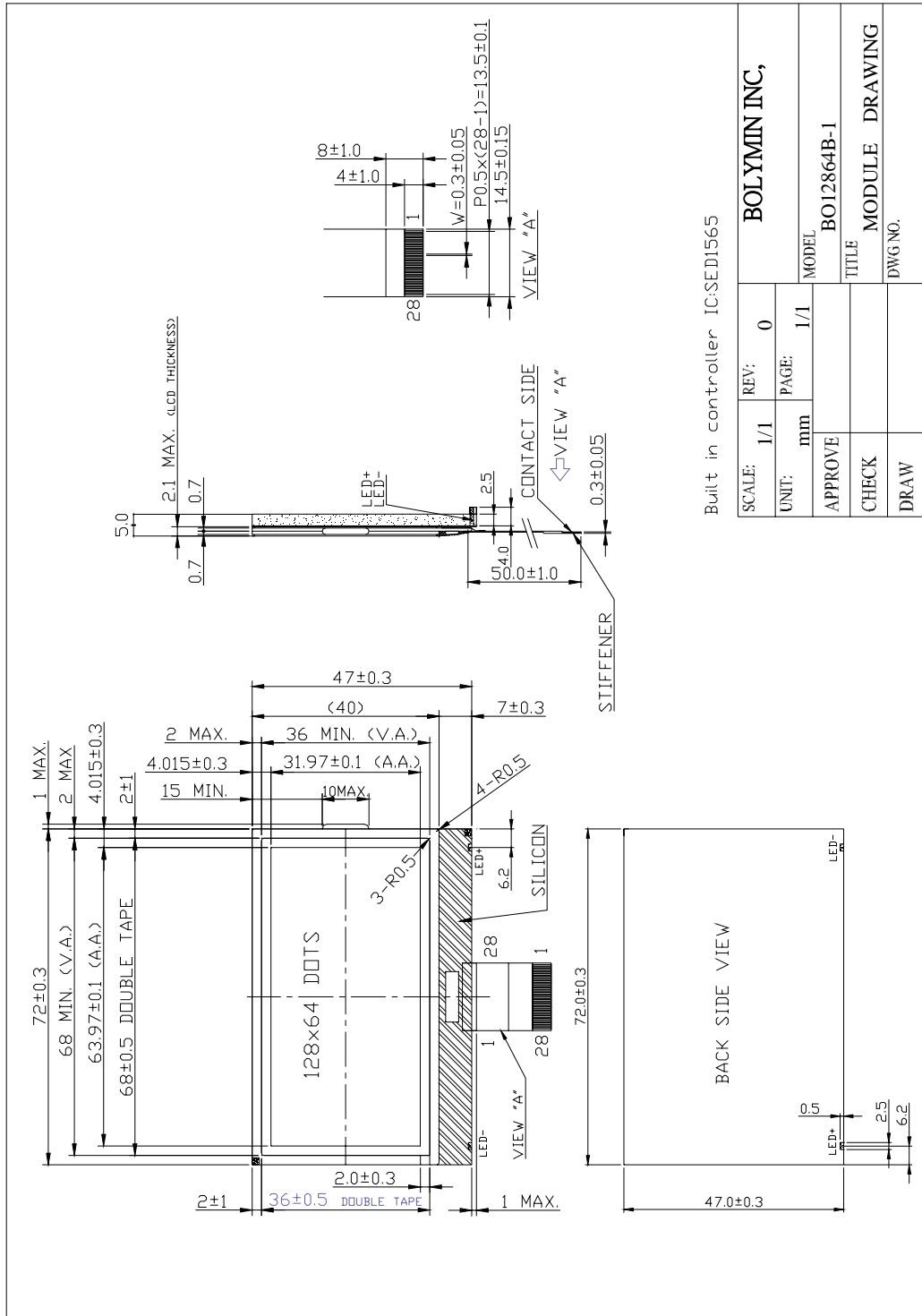
■ Content of Reliability Test

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.	70°C 200hrs	—
2	Low Temperature storage	Endurance test applying the high storage temperature for a long time.	-30°C 200hrs	—
3	High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	60°C 200hrs	—
4	Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20°C 200hrs	—
5	High Temperature/ Humidity Storage	Endurance test applying the high temperature and high humidity storage for a long time.	60°C, 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°C, 90%RH 96hrs	—
7	Temperature Cycle	<p>Endurance test applying the low and high temperature cycle.</p> <p style="text-align: center;"> \leftarrow -10°C 25°C 60°C \rightarrow </p> <p style="text-align: center;"> 30min 5min 30min </p> <p style="text-align: center;">1 cycle</p>	-10°C/60°C 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 msdc 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 vo



11.1 Outline Dimension



Built in controller IC:SEDI565

SCALE: 1/1		REV: 0	BOLYMIN INC.	
UNIT: mm	PAGE: 1/1	MODEL BO12864B-1		
APPROVE	CHECK	TITLE MODULE DRAWING		
DRAW	DWG. NO.			

Bolymin, Inc.



11.2SED1565 controller spec.

Reference EPSON SED15605 Spec.