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LCD MODULE SPECIFICATION

MODEL NO.

BP12864C series

FOR MESSRS:

_____

ON DATE OF:

_____

APPROVED BY:

_____

C O N T E N T S

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2. General Specification

3. Absolute Maximum Ratings

4. Electrical Characteristics

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1. Numbering System

B	P	12864	C	F	P	H	_	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
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	128×64	dots
Module dimension (L*W*H)	57.0*42.5*2.5(Max)-EL B/L 58.2*44.7*4.7-LED B/L	mm
View area	52.0(W)×33.5(H)	mm
Active area	47.34(W)×26.86(H)	mm
Dot size	0.35(W)×0.4(H)	mm
Dot pitch	0.37(W)×0.42(H)	mm

(2) Controller IC: S6B1713 Controller

(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}	V
Supply Voltage For Logic	VDD-VSS	2.4	—	3.6	V
Supply Voltage For LCD	VO-VSS	4.0	—	15	V

4. Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply Voltage For Logic	V_{DD}-V_{SS}	—	2.7	3.3	3.6	V
Supply Voltage For LCD	V_{DD}-V_O	Ta=-20℃ Ta=25℃ Ta=+70℃	— — —	9.5 8.5 7.5	— — —	V V V
Input High Vol	V_{IH}	—	0.8V_{DD}	—	V_{DD}	V
Input Low Vol	V_{IL}	—	0	—	0.2V_{DD}	V
Output High Vol	V_{OH}	—	V_{DD} -0.4	—	—	V
Output Low Vol.	V_{OL}	—	—	—	0.4	V
Supply Current	I_{DD}	V_{DD}=3V	—	—	500	uA

5. Optical Characteristics

a. STN

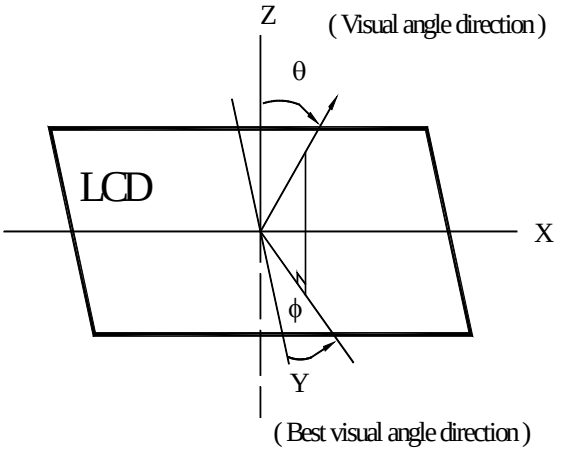
Item	Symbol	Condition	Min.	Typ.	Max.	Unit
View Angle	(V) θ	CR≧2	10		45	deg
	(H) φ	CR≧2	-30		30	deg
Contrast Ratio	CR	—		3		—
Response Time 25℃	T rise	—		100	150	ms
	T fall	—		150	200	ms

b. FSTN

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
View Angle	(V) θ	CR≧5	10		60	deg
	(H) φ	CR≧5	-45		45	deg
Contrast Ratio	CR	—		5		—
Response Time 25℃	T rise	—		100	150	ms
	T fall	—		150	200	ms

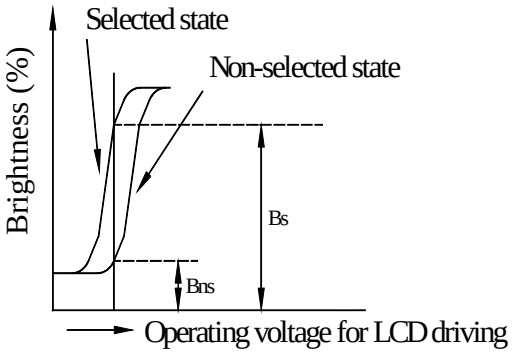
5.1 Definitions

■View Angles

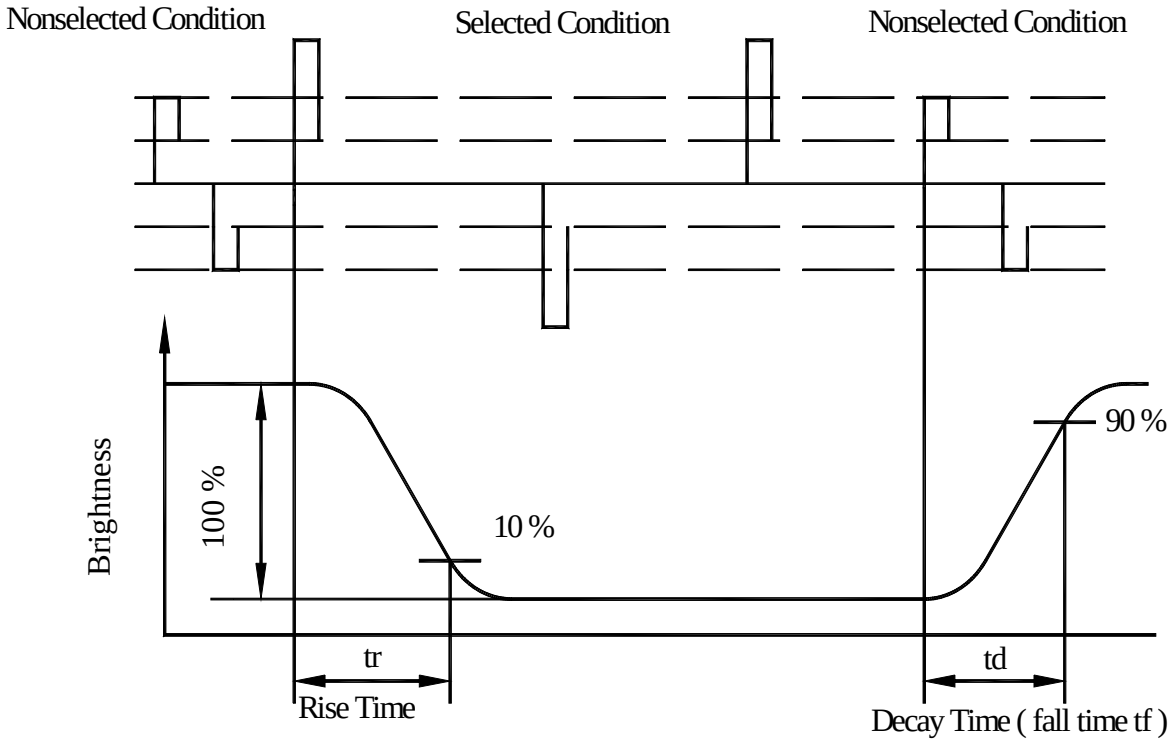


■Contrast Ratio

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



■Response time



6. Interface Pin Function

Pin No.	Symbol	I/O	Description
1	NC	—	No connection
2	TEMPS	I	Selects temperature coefficient of the reference voltage TEMPS=”L”: -0.05%℃, TEMPS=”H”: -0.2%℃
3	INTRS	I	Internal resistors select pin This pin selects the resistors for adjusting V0 voltage level. INTRS=”H”: use the internal resistor. INTRS=”L”: use the external resistor. V0 voltage is controlled with VR pin and external resistive divider.
4	HPM	I	Power control pin of the power supply circuit for LCD driver. HPM=”H”: high power mode HPM=”L”: normal power mode This pin is valid in master operation.
5	DCDC5B	I	5times boosting circuit enable input pin. When this pin is low in 4 times boosting circuit, the 5-time boosting voltage appears at VOUT.
6	BSTS	I	Select input voltage of the built-in voltage converter. Voltage converter input BSTS=”H”: 4V (VDD>4V) BSTS=”L”: VDD (2.4V≦VDD≦5.5V) When BSTS pin is “L”, VDD must be higher than 4V in our 4-time boosting.
7~11	V0~V4	I/O	LCD driver supply voltages. The voltage determined by LCD pixel is impedance-converted by an operational amplifier for application. Voltages should have the following relational; V0≧V1≧V2≧V3≧V4≧VSS
12	VR	I	V0 voltage adjustment pin. It is valid only when on-chip resistors are not used(INTRS=”L”)
13	C2-	O	Capacitor 2 negative connection pin for voltage converter.
14	C2+	O	Capacitor 2 positive connection pin for voltage converter.
15	C1-	O	Capacitor 1 negative connection pin for voltage converter.
16	C1+	O	Capacitor 1 positive connection pin for voltage converter.
17	C3-	O	Capacitor 1 negative connection pin for voltage converter.
18	C3+	O	Capacitor 1 positive connection pin for voltage converter.
19	VOUT	I/O	Voltage converter input/output pin.
20	VDD	—	Power supply pin for logic.
21	VSS	—	Ground pin, connected to 0V
22	PS	I	Parallel/Serial data input select pin. Interface Data Read/Write Serial clock PS=”H”: Parallel DB0~DB7 E_RD,RW_WR - PS=”L”: Serial SID(DB7) Write only SCLK(DB6) In serial mode, it is impossible to read data from the on-chip RAM. And DB0 to DB5 are high impedance and E_RD and RW_WR must be fixed to either “H” or “L”.

23	MI	I	Microprocessor interface selects pin. MI=”H”: 6800-series MPU interface MI=”L”: 8080-series MPU interface
24	CLS	I	Built-in oscillator circuit enable/disable select pin. CLS=”H”: enable CLS=”L”: disable(external display clock input from CL pin)
25	MS	I	Master or Slave mode operation select pin. MS=“H” : master operation MS=“L” : slave operation
26 27	DUTY1 DUTY0	I	The LCD driver duty ratio depends on the following table DUTY1 DUTY0 Duty ratio L L 1/33 L H 1/49 H L 1/65
28~35	DB7~DB0	I/O	8-bit bi-directional data bus that is connected to the standard 8-bit microprocessor data bus. When the serial interface selected(PS=”L”) DB0~DB5: high impedance DB6: serial input clock (SCLK) DB7: serial input data (SID) When chip select is not active, DB0~DB7 may be high impedance.
36	E_RD	I	When connected to 80-family MPU: Read enable clock input pin. When /RD is “L”, DB0~DB7 are in an output status When connected to 68-family MPU: RW = ”H”: When E is “H”, DB0~DB7 are in an output status RW = “L”: The data on DB0~DB7 are latched at the falling edge of the E signal
37	RW_WR	I	When connected to 80-family MPU: Write enable clock input pin. The data ON DB0~DB7 are latched at the rising edge of the /WR signal. When connected to 68-family MPU: RW = ”H”: read RW = “L”: write
38	RS	I	Register select pin RS=”H”: DB0~DB7 are display data RS=”L”: DB0~DB7 are control data
39	RESETB	I	Reset input pin When RESETB is “L”, initialization is executed.
40 41	CS2 CS1B	I	Chip select input pins Data/instruction I/O enable only when CS1B is “L” and CS2 is “H”. When chip select is non-active, DB0~DB7 may be high impedance.

7. Backlight Information

7.1 Specification

(1) EL / White

Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Drive Voltage	Vmax	78	—	85	Vrms	25°C

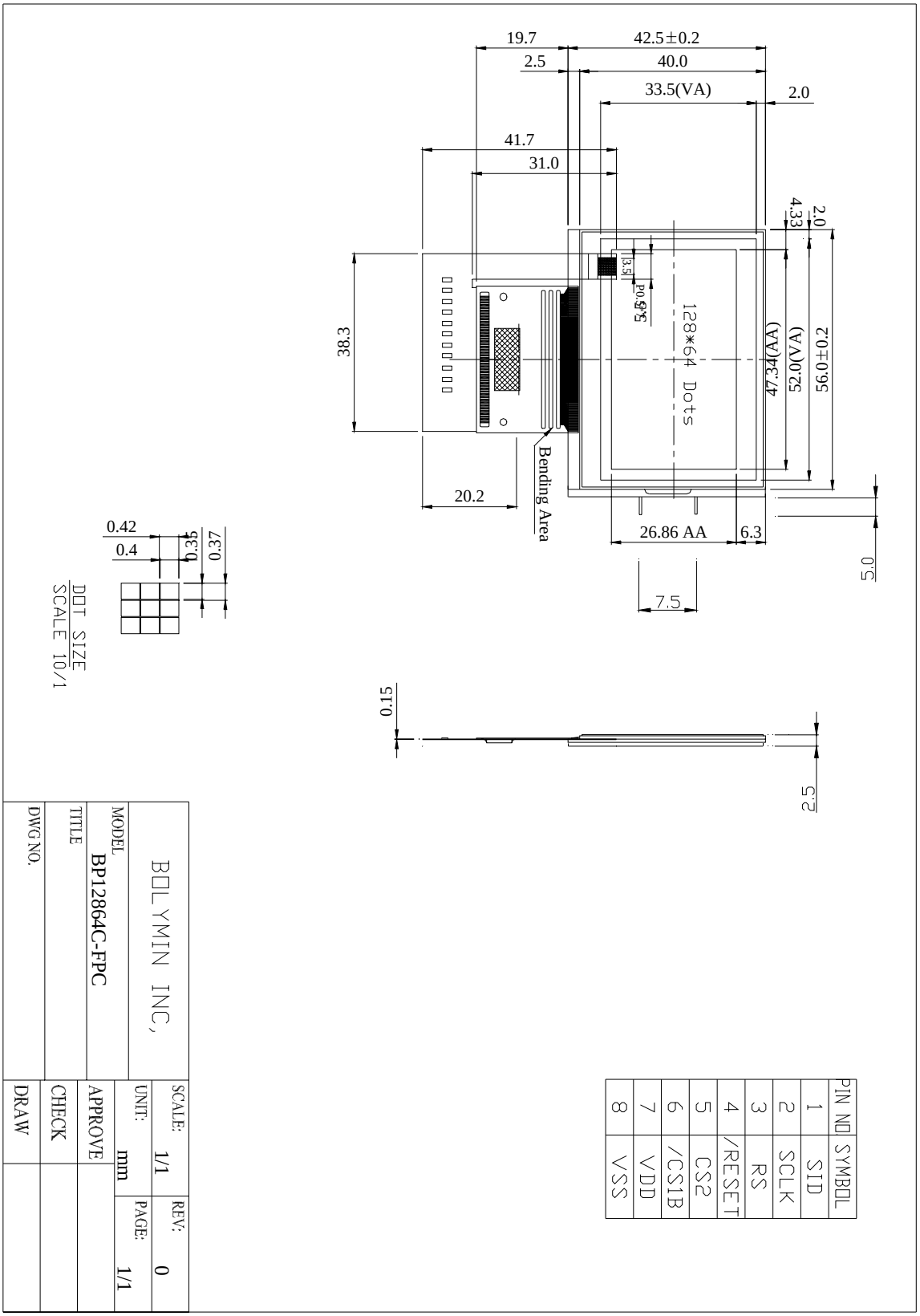
Drive Wave	Fmax	400	—	1000	Hz	25°C
Brightness		65	—	—	cd/m^2	78~85Vrms/400~1000Hz
Power Consumption		—	43.55	—	mW	78~85Vrms/400~1000Hz
Chromatism	X	—	0.330	—	—	78~85Vrms/400~1000Hz
	Y	—	0.365	—	—	78~85Vrms/400~1000Hz
Life time		5000			hour	78~85Vrms/400~1000Hz
Color		White			—	—

(1) LED / White

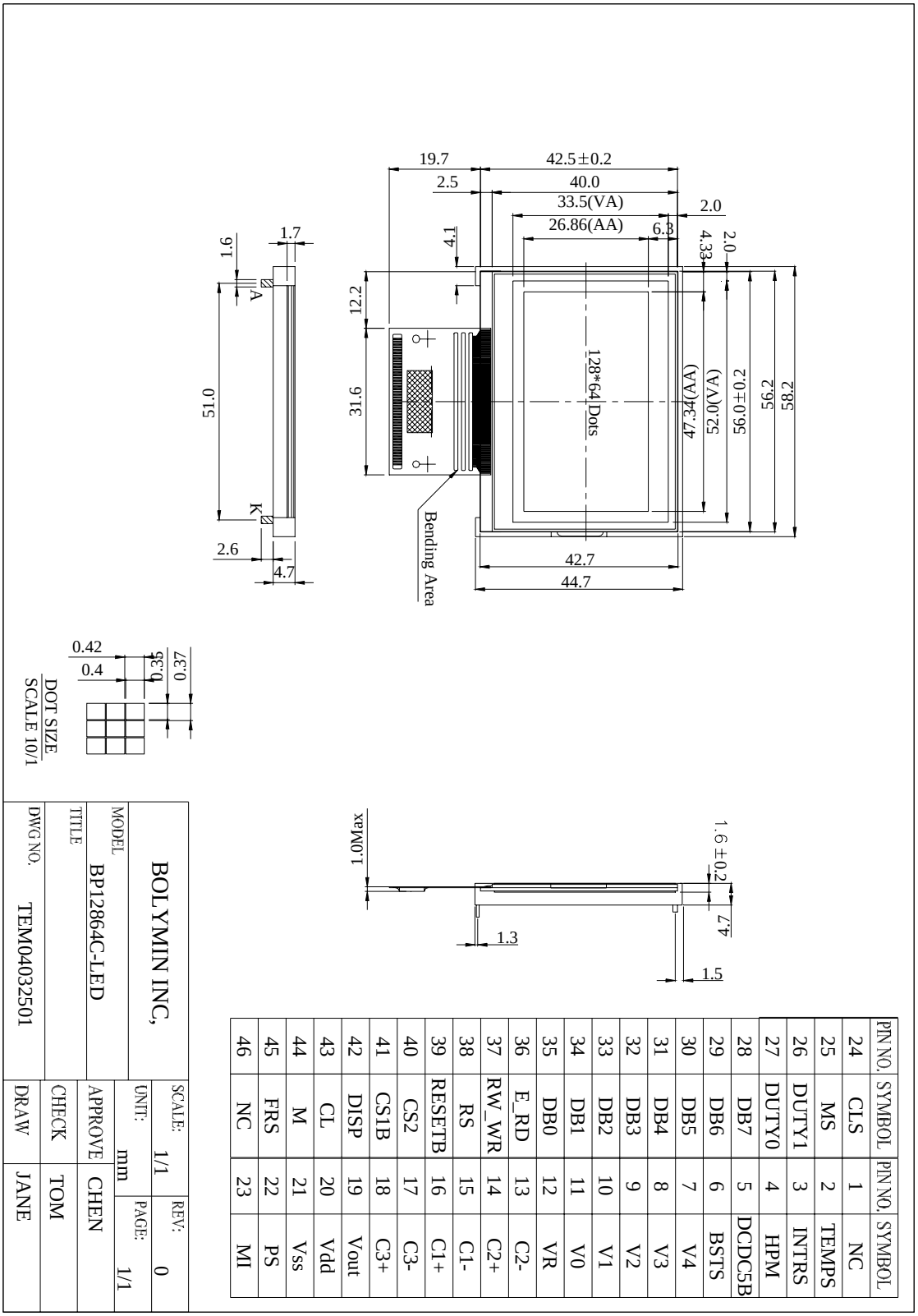
Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Supply Current	ILED	—	45		mA	V=3.4V
Supply Voltage	V	—	3.4	3.6	V	
Reverse Voltage	VR	—	—	5	V	
Luminous Intensity	IV	80		—	cd/m^2	ILED=45mA
Wave Length	X	0.240		0.300		ILED=45mA
	Y	0.240		0.320		
Life Time		—	50000	—	Hr.	Iled=15mA Each chip
Color	White					

8. Appendix (Drawing , S6B1713 Controller)

8-1 Drawing EL B/L


19.7
42.5±0.2
2.5
40.0
33.5(VA)
2.0
41.7
31.0
2.0
4.33
13.5
P0.9*5
128*64 Dots
47.34(AA)
52.0(VA)
56.0±0.2
38.3
Bending Area
20.2
26.86 AA
6.3
7.5
5.0
0.42
0.4
0.38
0.37
DOT SIZE
SCALE 10/1
0.15
2.5
PIN NO SYMBOL
1 SID
2 SCLK
3 RS
4 /RESET
5 CS2
6 /CS1B
7 VDD
8 VSS
BOLYMIN INC,
MODEL
BP12864C-FPC
TITLE
DWG NO.
SCALE: 1/1
REV: 0
UNIT: mm
PAGE: 1/1
APPROVE
CHECK
DRAW

8-2 Drawing LED B/L

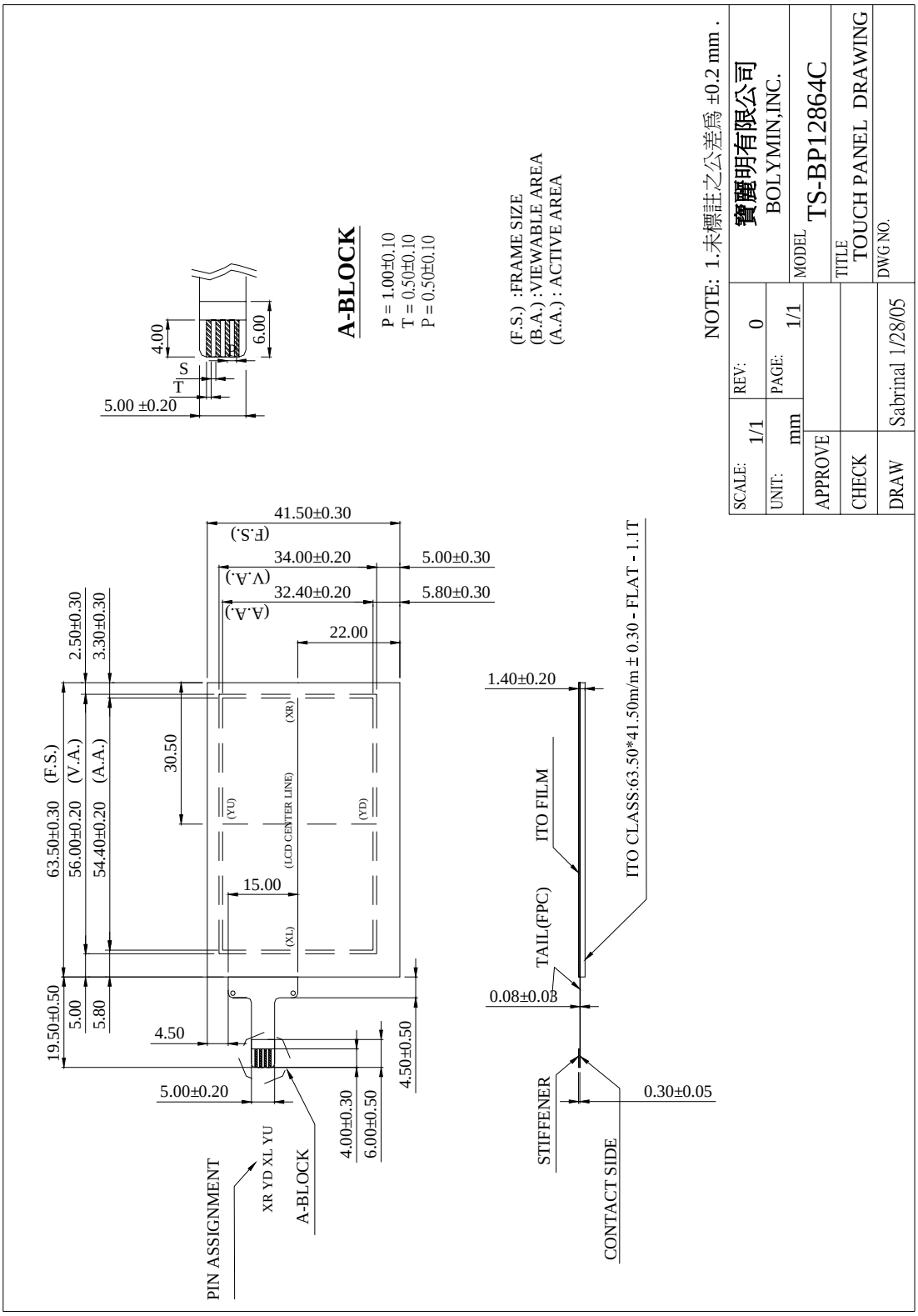


PIN NO.	SYMBOL	PIN NO.	SYMBOL
24	CLS	1	NC
25	MS	2	TEMPS
26	DUTY1	3	INTRS
27	DUTY0	4	HPM
28	DB7	5	DCDC5B
29	DB6	6	BSTS
30	DB5	7	V4
31	DB4	8	V3
32	DB3	9	V2
33	DB2	10	V1
34	DB1	11	V0
35	DB0	12	VR
36	E_RD	13	C2-
37	RW_WR	14	C2+
38	RS	15	C1-
39	RESETB	16	C1+
40	CS2	17	C3-
41	CS1B	18	C3+
42	DISP	19	Vout
43	CL	20	Vdd
44	M	21	Vss
45	FRS	22	PS
46	NC	23	MI

8-3 S6B1713 Controller(Power setup)

Power control	**2Fh**
Regulator resistor select	**24h**
Set reference voltage mode	**0Fh**

9.Touch Panel Specifications



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ELECTRICAL SPECIFICATIONS

ITEM	SPECIFICATION	CONDITION
ON RESISTANCE	250Ω ~ 750Ω	DIRECTION:X
	250Ω ~ 800Ω	DIRECTION:Y
INSULATION RESISTANCE	MORE THAN 20MΩ	DC 25V
CHATTERING TIME	LESS THAN 10 msec	100K PULL-UP
LINEARITY	±1.0%	X AXIS
	±1.0%	Y AXIS

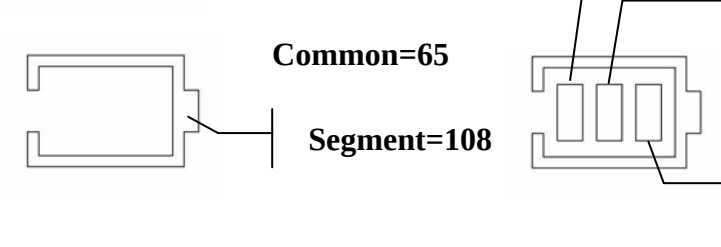
MACHINE SPECIFICATIONS

ITEM	SPECIFICATION	CONDITION
OPERATING FORCE	LESS THAN 80g	R8.0 HS 40 ° SILICON RUBBER OR R0.8 POLYACETAL PEN
SURFACE HARDNESS	MORE THAN 2H	PENCIL TEST
LIGHT TRANSMISSION	MORE THAN 80 %	@550nm HITACHI U3300
DURABILITY FOR PEN SELECTIONS	MORE THAN 1,200,000 TIMES	FORCE:250g SPEED:2cm/sec

ICON

Common=65
Segment=125

Common=65
Segment=115



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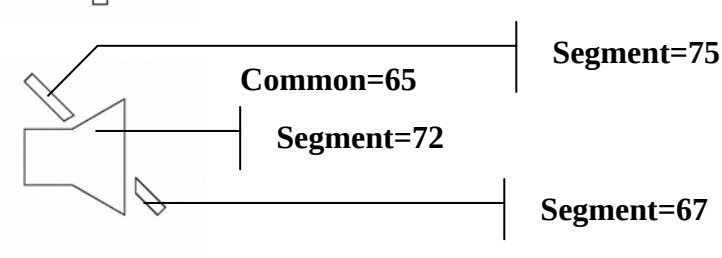
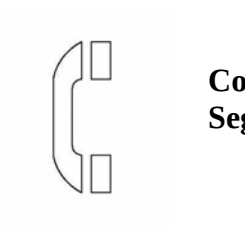
Segment=92

Common=65
Segment=81





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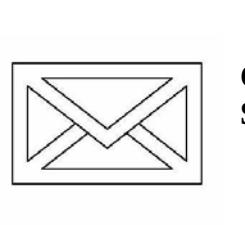

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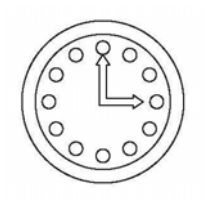
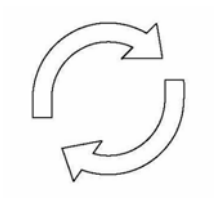


Common=65
Segment=26

Common=65
Segment=15



Common=65
Segment=5