ELSTORE

SPECIFICATIONS

CUSTOMER	:	
SAMPLE CODE	:	
MASS PRODUCTION CODE	:	ELSCOG12864BKWT-B
SAMPLE VERSION	:	
SPECIFICATIONS EDITION	:	
DRAWING NO. (Ver.)	:	
PACKAGING NO. (Ver.)	:	

Customer Approved

Date:

POWERTIP
2018.09.25
JS RD APPROVED
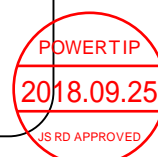
Approved	Checked	Designer
閆偉	劉進	徐明菲

■　　Preliminary specification for design input

□　　Specification for sample approval

NO.PT-A-005-8

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History of Version

Date	Ver.	Edi.	Description	Page	Design by
01/11/2018	01	001	New Drawing	-	徐明菲
04/13/2018	01	002	New Sample	-	徐明菲
09/17/2018	02	003	Second Drawing (Modify the width of Shading tape on Backlight)	-	徐明菲

Total：33 Pages

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Contents

Note : For detailed information please refer to IC data sheet : NOVATEK - NT7534H-BDT

1. SPECIFICATIONS

1.1　Features

Item	Standard Value
Display Type	128 * 64 Dots
LCD Type	FSTN White, Positive, Transflective, Extended Temp.
Driver Condition	LCD Module : 1/65 Duty, 1/9 Bias
Viewing Direction	6 O'clock
Weight	-
Interface	6800 Serial data input/Parallel data input
Controller / Driver IC	NT7534
ROHS	THIS PRODUCT CONFORMS THE ROHS OF PTC Á

1.2 Mechanical Specifications

Item	Standard Value	Unit
Outline Dimension	67.2 (L) * 48.2 (W) * 5.3 (H)	mm
Viewing Area	61.0 (L) * 31.4 (W)	mm
Active Area	57.58 (L) * 28.78 (W)	mm
Dot Size	0.43 (L) * 0.43 (W)	mm
Dot Pitch	0.45 (L) * 0.45 (W)	mm

Note : For detailed information please refer to LCM drawing

1.3 Absolute Maximum Ratings

Item	Symbol	Condition	Min.	Max.	Unit
Power Supply Voltage	V_{DD}	-	-0.3	+4.0	V
LCD Driver Supply Voltage	V_0, V_{OUT}	-	-0.3	+15.0	V
Input Voltage	V_{IN}	-	-0.3	V_{DD}+0.3	V
Operating Temperature	T_{OP}	-	-20	+70	℃
Storage Temperature	T_{ST}	-	-30	+80	℃
Storage Humidity	H_D	Ta＜60 ℃	20	90	%RH

1.4 DC Electrical Characteristics

VDD = 3.3V, VSS = 0V, Ta = 25℃

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Logic Supply Voltage	V_{DD}	-	3.0	3.3	3.6	V
"H" Input Voltage	V_{IH}	-	$0.8V_{DD}$	-	V_{DD}	V
"L" Input Voltage	V_{IL}	-	V_{SS}	-	$0.2V_{DD}$	V
"H" Output Voltage	V_{OH}	-	$0.8V_{DD}$	-	V_{DD}	V
"L" Output Voltage	V_{OL}	-	V_{DD}	-	$0.2V_{DD}$	V
Supply Current	I_{DD}	V_{DD}= 3.3V; VOP= 8.2V;	-	1.0	1.5	mA
LCM Driver Voltage	Vop*1	-20°C	8.8	9.0	9.2	V
		+25°C	8.0	8.2	8.4	
		+70°C	7.3	7.5	7.7	

Note : *1. The VOP test point is V0~VSS

1.5 Optical Characteristics

LCD Panel: 1/65 Duty, 1/9 Bias, VLCD = 8.2V, Ta = 25°C

Item		Symbol	Conditions	Min.	Typ.	Max.	Unit	Reference
Response Time	Rise	tr	-	-	107	161	ms	Note 2
	Fall	tf		-	300	450		
Viewing angle range	Top	θ+	C≥2.0	-	40	-	-	Notes 1
	Bottom	θ-		-	40	-		
	Left	θL		-	45	-		
	Right	θR		-	45	-		
Contrast Ratio		CR	θ = 0°	-	9.5	-	-	Note 3
Average Brightness (LCD & B/L) *2		IV	Vf=5V	(170)	(260)	-	cd/m²	Note 4
CIE Color Coordinate (LCD & B/L) *2		X		(0.25)	(0.30)	(0.35)	-	
		Y		(0.26)	(0.31)	(0.36)	-	
Uniformity *1		△B		70	-	-	%	

Note 4：

1：△B=B(min) / B(max)*100%

2：Measurement Condition for Optical Characteristics:

    a：Environment: 25℃±5℃ / 60±20%R.H，no wind，dark room below 10 Lux at typical lamp current and typical operating frequency.

    b：Measurement Distance: 500 ± 50 ㎜ ，(θ= 0°)

    c：Equipment: TOPCON BM-7 fast，(field 0.2°)，after 10 minutes operation.

    d：The uncertainty of the C.I.E coordinate measurement ±0.01，Average Brightness ± 4%

Colorimeter=BM-7 fast
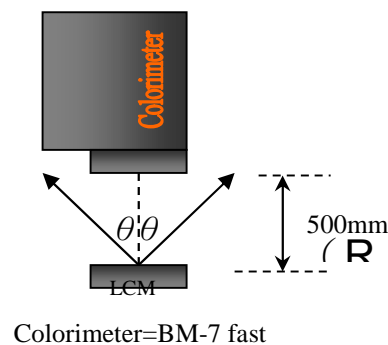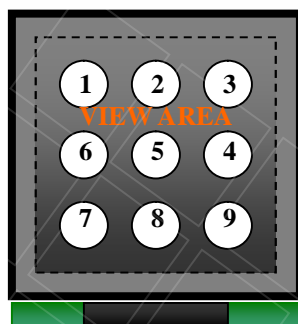
  3： This value will be changed while mass production.

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Note 1.

Optical characteristics-2

Viewing angle

Rear (12H)
$\varphi = 90°$

Top ($\theta = 0°$)

θL

θR

$\theta +$

Left (9H)
$\varphi = 180°$

$\theta -$

Right (3H)
$\varphi = 0°$

Front (6H)
$\varphi = 270°$
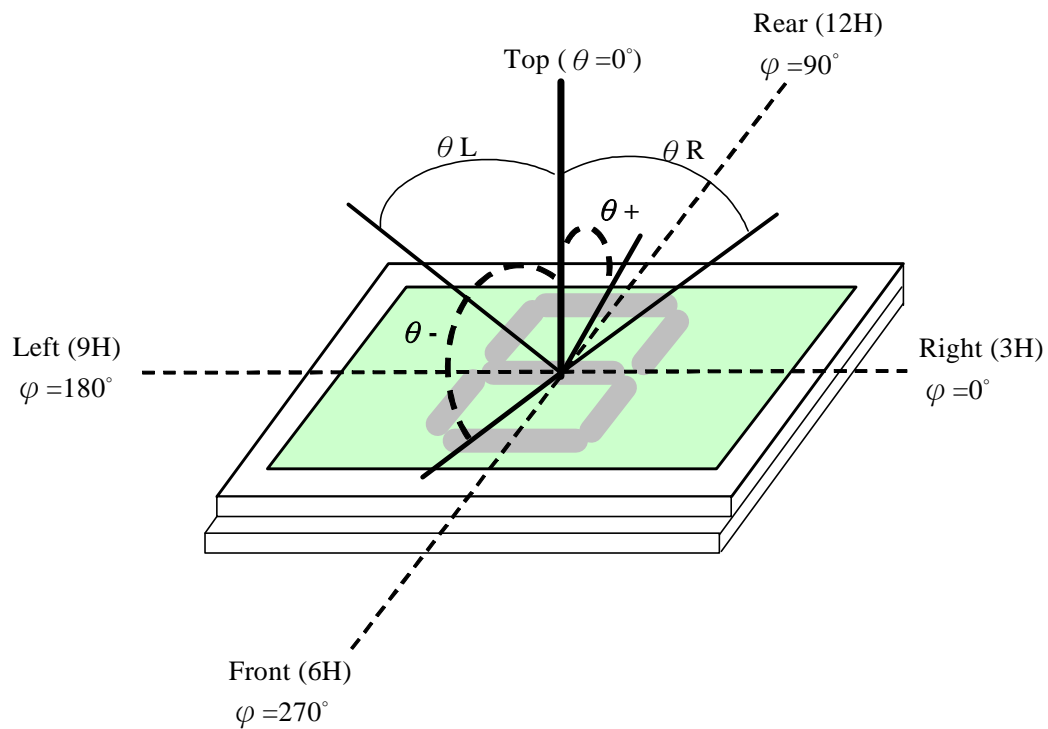
Viewing angle

Note 2.

Optical characteristics-3
  Fig.2 Definition of response time

| Positive Type |

No selected waveform → ← Selected waveform → ← No selected waveform

Transmittance

100% 90% 10%

Tr   Tf

| Negative Type |

No selected waveform → ← Selected waveform → ← No selected

Transmittance

100% 90% 10%

Tr   Tf
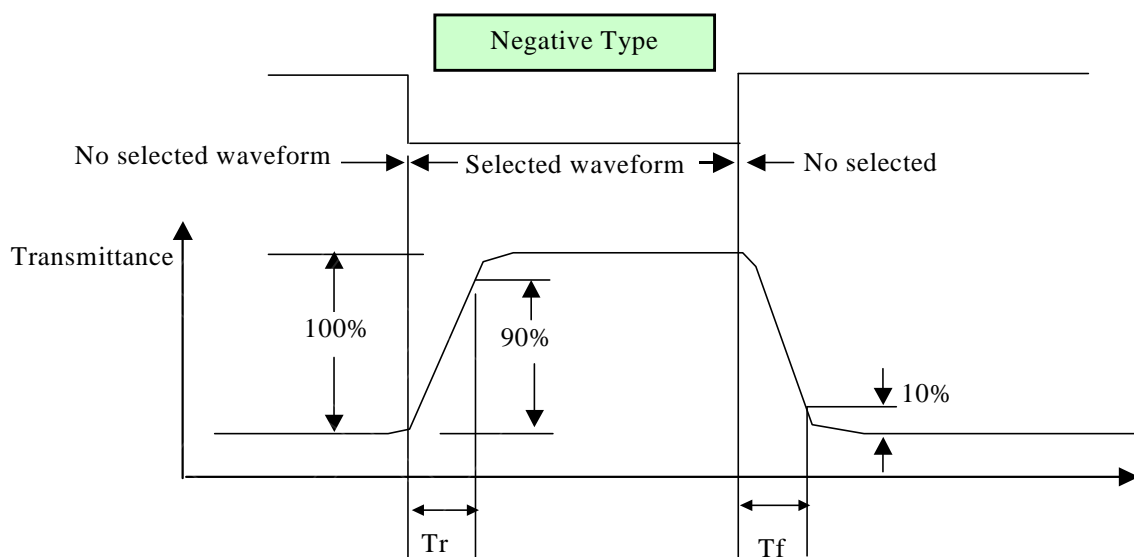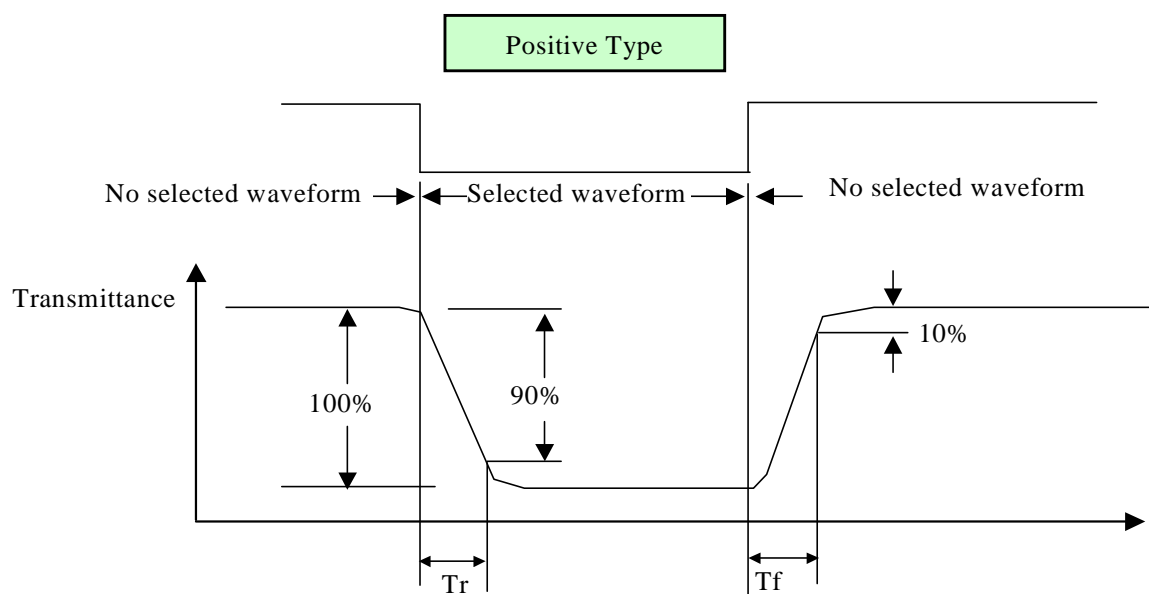
Electrical characteristics-2

　※2 Drive waveform
　Vop: Drive voltage　　fF: Frame frequency
　1/B: Bias　　　　　　fD: Drive frequency
　N: Duty

(1) Selected waveform

V

Vop/B

Vop/B

V

1　　2　　3　　　N　1　　2　　3

1/fD

1/fF

(2) Non- Selected wave form

(1-2/B)Vop

Vop/B

Vop/B

(1-2/B)Vop

1　　2　　3　　　N　1　　2　　3

1/fD

1/fF
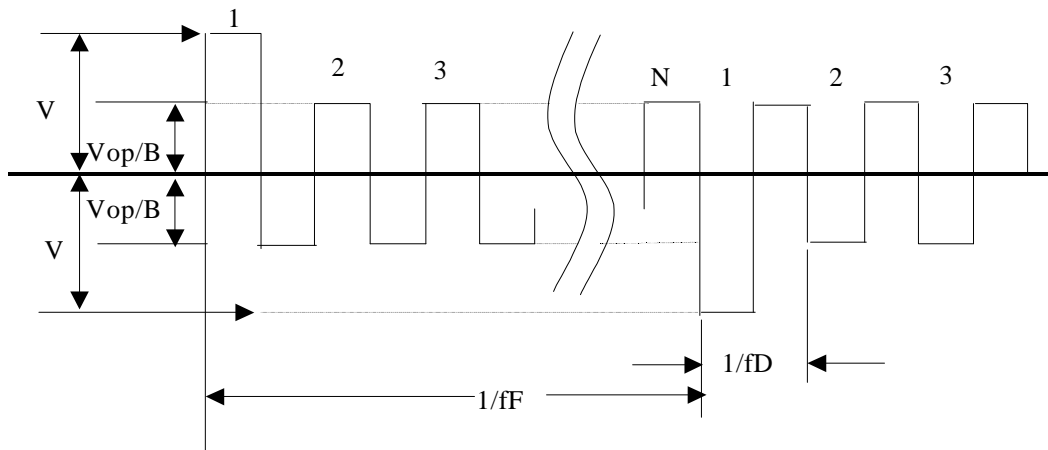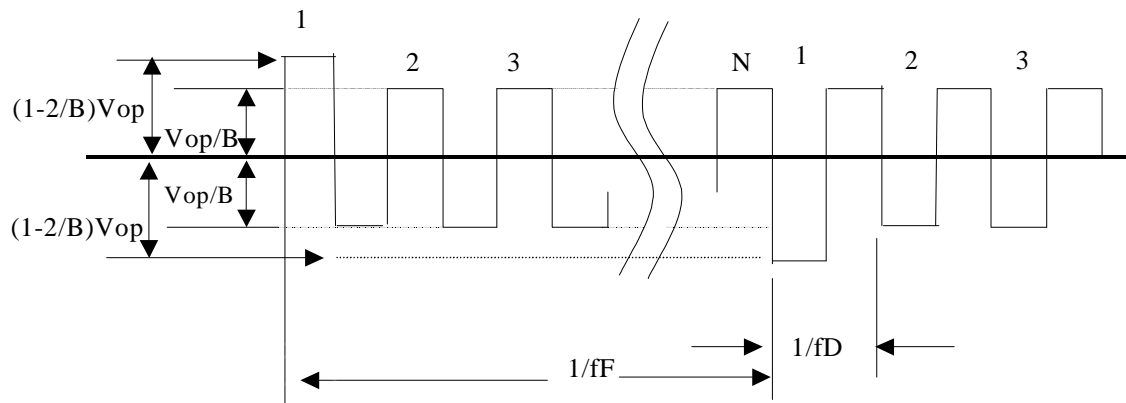
Note:
Frame frequency is defined as follows: Common side supply
voltage peak - to - peak /2 = 1 period

Note 3. : Definition of Vth

Active voltage range
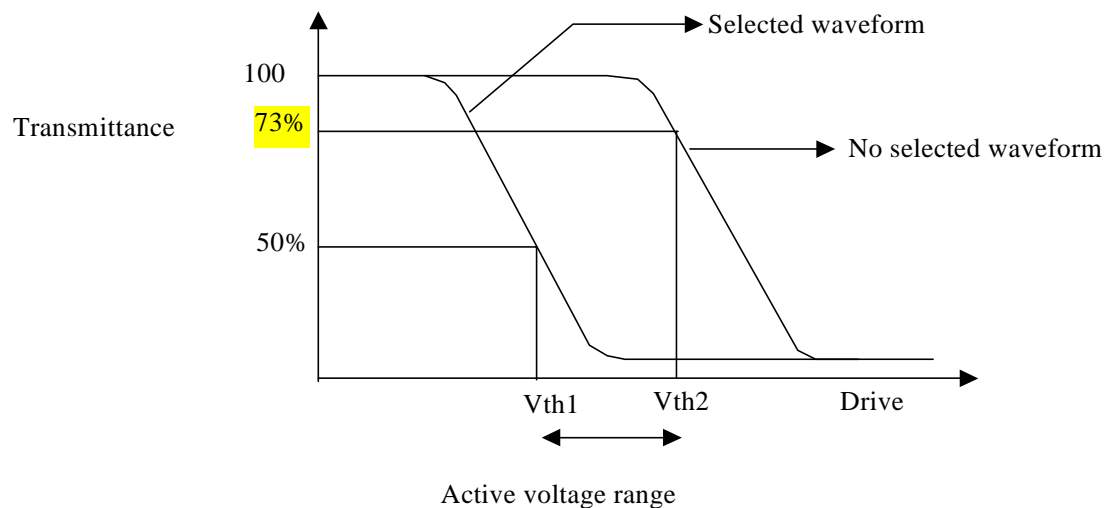
	Vth1	Vth2
View direction	10°	40°
Drive waveform	(Selected waveform)	(No selected waveform)
Transmittance	50%	73%

※1 Contrast ratio
= (Brightness in OFF state) / (Brightness in ON state)

Outline of Electro-Optical Characteristics Measuring System

Measuring System: Autronic DMS-803
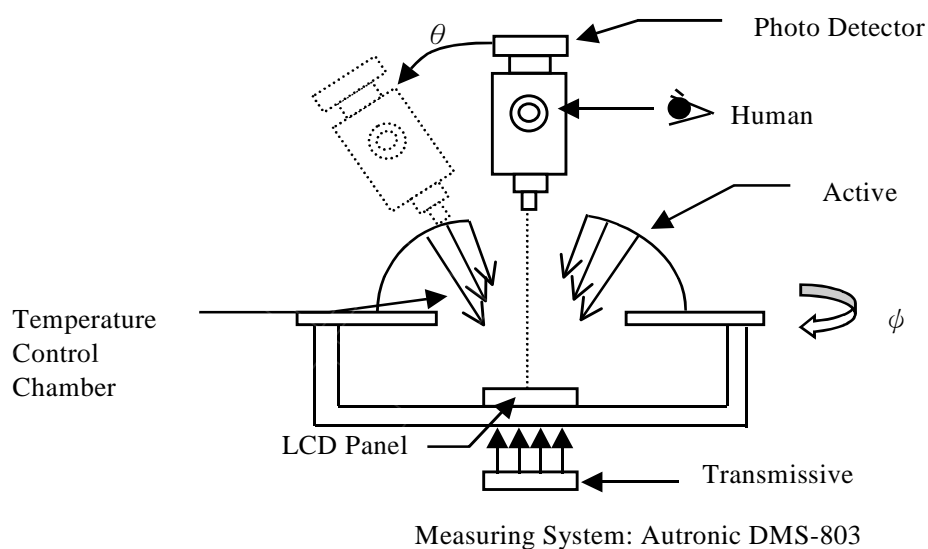
1.6 Backlight Characteristics

Maximum Ratings

Item	Symbol	Conditions	Min.	Max.	Unit	Remark
Reverse Voltage	IF	Ta=25℃	-	30	mA	Each LED
Forward Current	VR	Ta=25℃	-	5	V	Each LED
Power dissipation	PD	Ta=25℃	-	225	mW	-

Electrical / Optical Characteristics

Ta =25℃

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage	IF		15	30	45	mA
Average Brightness (Without LCD)	IV	VF=5V	1050	1260	-	cd/m^2
CIE Color Coordinate (Without LCD)	X		0.26	0.28	0.31	-
	Y		0.26	0.28	0.31	-
Color		White				

Circuit Diagram:
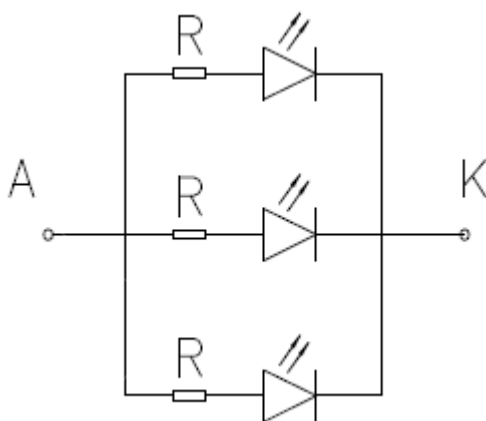
2. MODULE STRUCTURE

2.1 Counter Drawing

2.1.1 LCM Mechanical Diagram

* See Appendix

2.1.2 Block Diagram
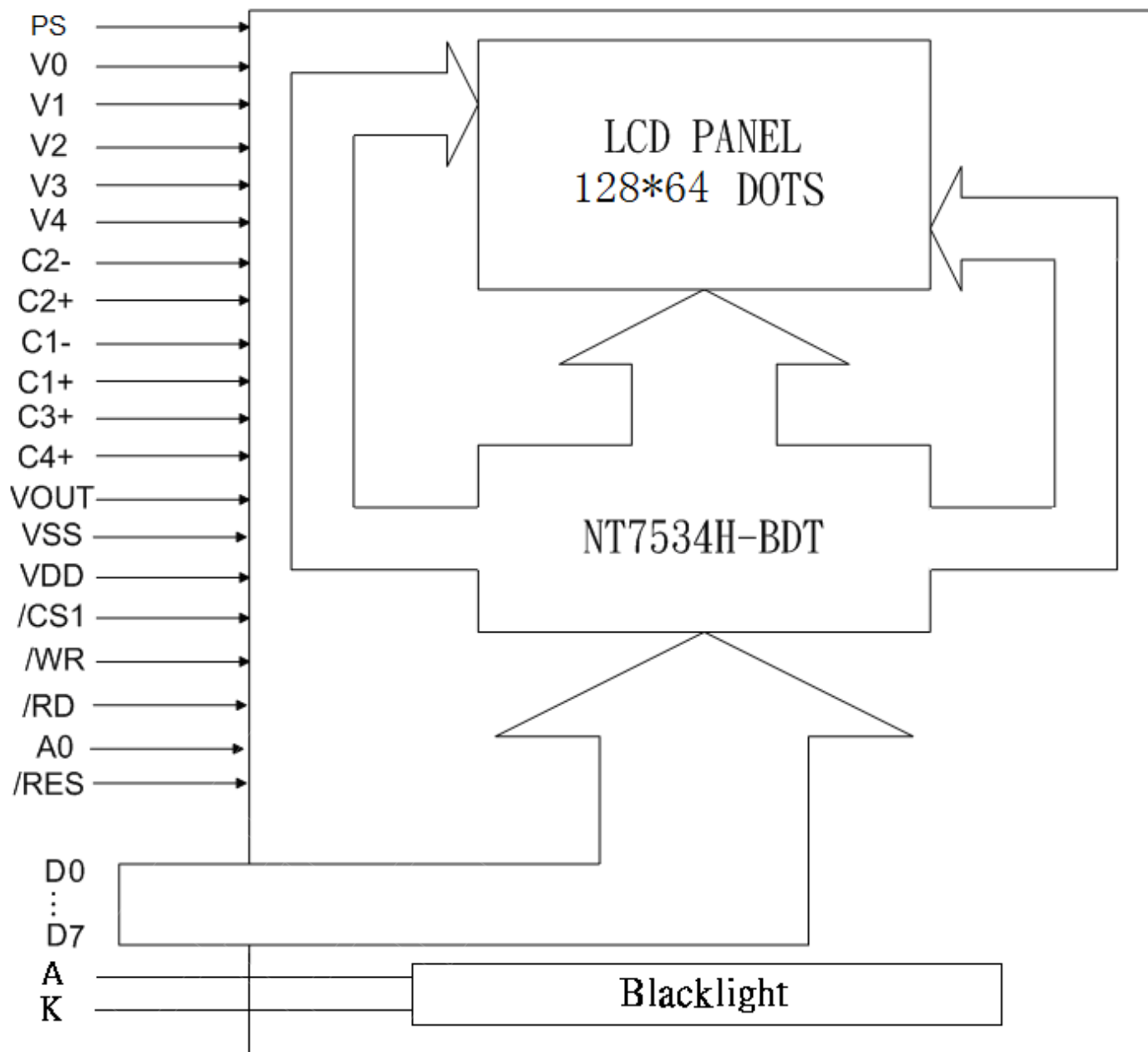
2.2 Interface Pin Description

Pin No.	Symbol	Function
1	/CS1	Chip Select signal. Active "L".
2	/RES	When /RES is set to "L", the settings are initialized.
3	A0	This is connected to the least significant bit of the normal MPU address bus, and it determines whether the data bits are data or a command. A0 = "H": Indicate that DB0 to DB7 are display data. A0 = "L": Indicates that DB0 to DB7 are control data.
4	/WR(R/W)	When connected to a 6800 Series MPU, this is the read/write control signal input terminal. When R/W = "H": Read When R/W = "L": Write
5	/RD(E)	When connected to a 6800 Series MPU, this is active HIGH. This is used as an enable clock input of the 6800 series MPU
6	D0	This is an 8-bit bi-directional data bus that connects to an 8-bit or 16-bit standard MPU data bus. When the serial interface is selected (P/S="L"), then D7 serves as the serial data input terminal (SI) and D6 serves as the serial clock input terminal (SCL). At this time, D0 to D5 are set to high impedance. When the chip select is inactive, D0 to D7 are set to high impedance.
7	D1	
8	D2	
9	D3	
10	D4	
11	D5	
12	D6(SCL)	
13	D7(SI)	
14	VDD	Power supply. (+3.3V)
15	VSS	System ground. (0V)
16	VOUT	DC/DC Voltage converter output.
17	C4+	Capacitor 4+ pad for internal DC/DC voltage converter.
18	C3+	Capacitor 3+ pad for internal DC/DC voltage converter.
19	C1-	Capacitor 1- pad for internal DC/DC voltage converter.
20	C1+	Capacitor 1+ pad for internal DC/DC voltage converter.
21	C2+	Capacitor 2+ pad for internal DC/DC voltage converter.

Pin No.	Symbol	Function
22	C2-	Capacitor 2- pad for internal DC/DC voltage converter.
23	V1	LCD driver supply voltages. The voltage determined by LCD cell is impedance-converted by a resistive driver or an operation amplifier for application. Voltages should be according to the following relationship: V0 ≥ V1 ≥ V2 ≥ V3 ≥ V4 ≥ VSS When the on-chip operating power circuit is on, the following voltages are supplied to V1 to V4 by the on-chip power circuit. Voltage selection is performed by the LCD bias set command.
24	V2	
25	V3	
26	V4	
27	V0	

LCD bias	V1	V2	V3	V4
1/4 bias	3/4*V0	2/4*V0	2/4*V0	1/4*V0
1/5 bias	4/5*V0	3/5*V0	2/5*V0	1/5*V0
1/6 bias	5/6*V0	4/6*V0	2/6*V0	1/6*V0
1/7 bias	6/7*V0	5/7*V0	2/7*V0	1/7*V0
1/8 bias	7/8*V0	6/8*V0	2/8*V0	1/8*V0
1/9 bias	8/9*V0	7/9*V0	2/9*V0	1/9*V0

Pin No.	Symbol	Function
28	PS	This is the parallel data input/serial data input switch terminal P/S = "H": Parallel data input P/S = "L": Serial data input The following applies depending on the P/S status:

P/S	Data/Command	Data	Read/Write	Serial Clock
"H"	A0	D0-D7	/RD,/WR	-
"L"	A0	SI(D7)	Write only	SCL(D6)

A0 D0 to D7 /RD, /WR -

A0 SI (D7) Write only SCL (D6)

When P/S = "L", D0 to D5 are HZ. D0 to D5 may be "H", "L" or Open. /RD (E) and /WR (R/W) are fixed to either "H" or "L".With serial data input, RAM display data reading is not supported.

2.2.1 Application Notes

*Value of External Capacitance		
Item	Value	
C1	1.0 - 4.7	uF
C2	0.1 - 2.2	

2.2.2 Refer Initial Code

```
void Initial_Main(void)                    // For NT75451

{

     WriteCOM_Main(0xe2);//Software reset

     WriteCOM_Main(0xae);//Set Display off

     WriteCOM_Main(0x40);//Set start line

     WriteCOM_Main(0xa2);//Set 1/9 Bias

     WriteCOM_Main(0xa0);//Set ADC

     WriteCOM_Main(0xc8);//Set COM direction

     WriteCOM_Main(0xa6);//Set Normal

     WriteCOM_Main(0xa4);//Set Normal

     WriteCOM_Main(0x2f);//Set power VC,VR,VF

     WriteCOM_Main(0x25);//Set Ra/Rb

     WriteCOM_Main(0x81);//Set V0

     WriteCOM_Main(16);

     WriteCOM_Main(0xf8);//Set BOOSTER RATIO SET

     WriteCOM_Main(0x00);//4X

     WriteCOM_Main(0xaf);//Set Display ON

}
```

2.3 Timing Characteristics

For 6800 Series MPU
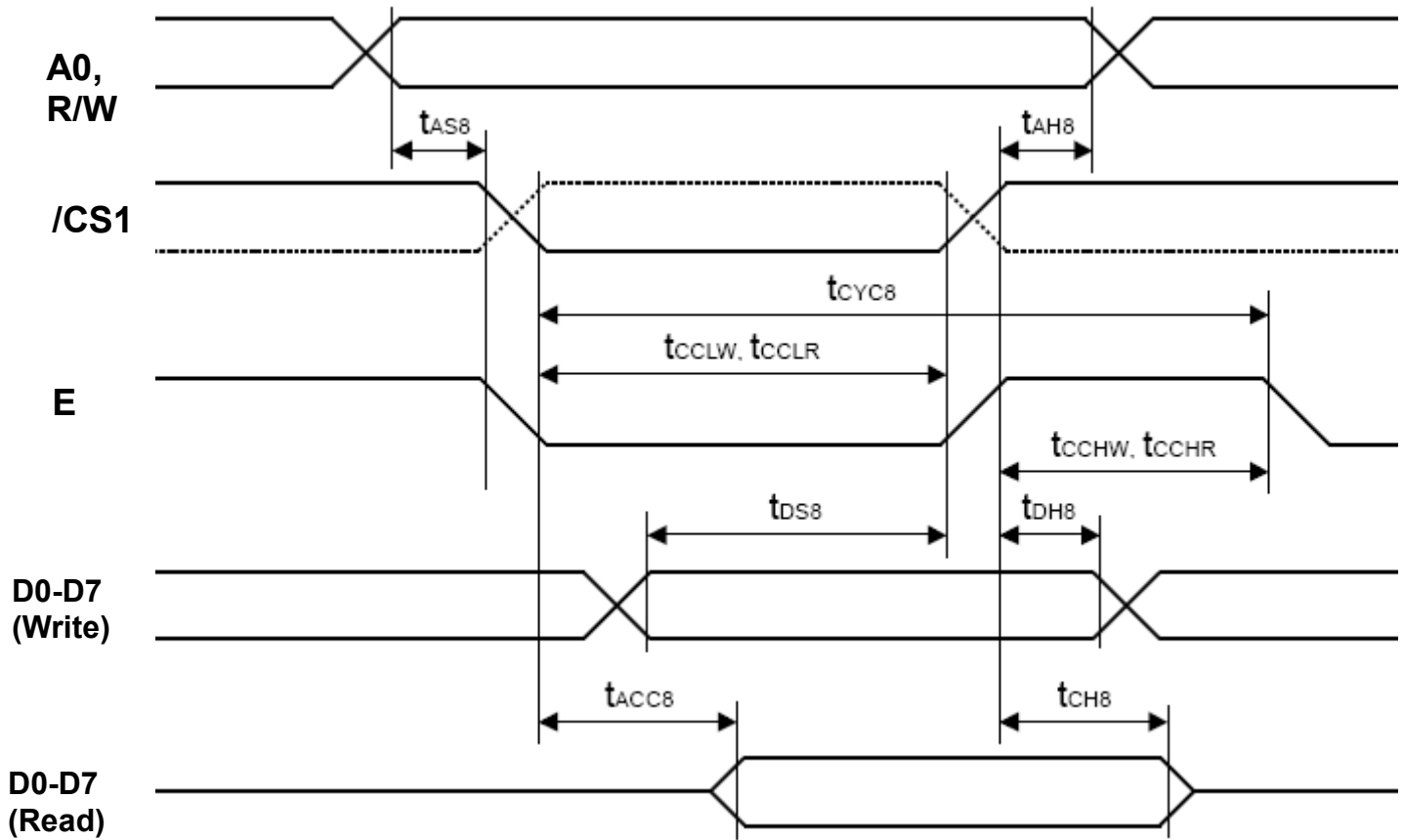
V_{DD} = 3.3 V , Ta = -40 to +85 °C

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Address hold time	t_{AH8}	0	-	-		A0,R/W
Address setup time	t_{AS8}	0	-	-		
System cycle time	t_{CYC8}	240	-	-		-
Control L pulse width (/WR)	t_{CCLW}	90	-	-		E
Control L pulse width (/RD)	t_{CCLR}	120	-	-		E
Control L pulse width (/WR)	t_{CCHW}	100	-	-	ns	E
Control L pulse width (/RD)	t_{CCHR}	60	-	-		E
Data setup time	t_{DS8}	40	-	-		D0~D7
Data hold time	t_{DH8}	10	-	-		
/RD access time	t_{ACC8}	-	-	140		D0~D7 , C_L = 100pf
Output disable time	t_{CH8}	5	-	50		

*1. The input signal rise time and fall time (tr, tf) is specified at 15ns or less.

   (tr + tf) < (t_{CYC8} - t_{CCLW} - t_{CCHW}) for write, (tr + tf) < (t_{CYC8} - t_{CCLR} - t_{CCHR}) for read.

*2. All timing is specified using 20% and 80% of VDD as the reference.

*3. t_{CCLW} and t_{CCLR} are specified as the overlap interval when /CS1 is low (CS2 is high) and E is low.

For Serial Interface

V_{DD} = 3.3V , Ta = -40 to +85 ºC

Item	Signal	Symbol	Condition	Rating Min	Rating Max	Units
Serial clock cycle	D6(SCL)	t_{SCYC}	-	120	-	ns
Serial clock H pulse width	D6(SCL)	t_{SHW}	-	60	-	ns
Serial clock L pulse width	D6(SCL)	t_{SLW}	-	60	-	ns
Address setup time	A0	t_{SAS}	-	30	-	ns
Address hold time	A0	t_{SAH}	-	20	-	ns
Data setup time	D7(SI)	t_{SDS}	-	30	-	ns
Data hold time	D7(SI)	t_{SDH}	-	20	-	ns
Chip select setup time	/CS1	t_{CSS}	-	20	-	ns
Chip select hold time	/CS1	t_{CSH}	-	40	-	ns

*1. The input signal rise time and fall time (**tr**, **tf**) is specified as 15ns or less.

*2. All timing is specified using 20% and 80% of VDD as the standard.

Reset Timing
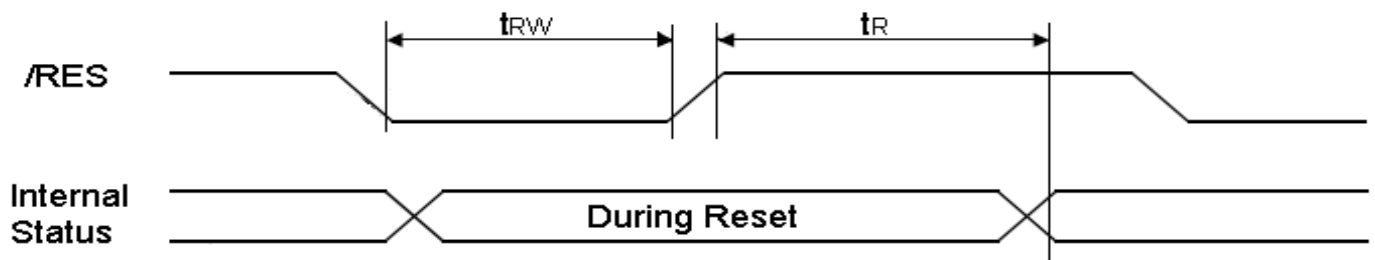
V_{DD} = 3.3V , Ta = -40 to +85 °C

Item	Signal	Symbol	Condition	Rating				Units
				Min	Typ	Max		
Reset time	-	t_R	-	-	-	1.0		µs
Reset low pulse width	/RES	t_{RW}		1.0	-	-		µs

2.4 Display Command

Command	A0	/RD	/WR	D7	D6	D5	D4	D3	D2	D1	D0	Hex	Function
(1) Display OFF	0	1	0	1	0	1	0	1	1	1	0 1	AEh AFh	Turn on LCD panel when high, and turn off when low
(2) Display Start Line Set	0	1	0	0	1	Display Start Address						40h to 7Fh	Specifies RAM display line for COM0
(3) Page Address Set	0	1	0	1	0	1	1	Page Address				B0h to B8h	Set the display data RAM page in Page Address register
(4) Column Address Set	0	1	0	0	0	0	1	Higher Column Address				00h to 18h	Set 4 higher bits and 4 lower bits of column address of display data RAM in register
	0	1	0	0	0	0	0	Lower Column Address					
(5) Read Status	0	0	1	Status				0	0	0	0	XX	Reads the status information
(6) Write Display Data	1	1	0	Write Data								XX	Write data in display data RAM
(7) Read Display Data	1	0	1	Read Data								XX	Read data from display data RAM
(8) ADC Select	0	1	0	1	0	1	0	0	0	0	0 1	A0h A1h	Set the display data RAM address SEG output correspondence
(9) Normal/Reverse Display	0	1	0	1	0	1	0	0	1	1	0 1	A6h A7h	Normal indication when low, but full indication when high
(10) Entire Display ON/OFF	0	1	0	1	0	1	0	0	1	0	0 1	A4h A5h	Select normal display (0) or entire display on
(11) LCD Bias Set	0	1	0	1	0	1	0	0	0	1	0 1	A2h A3h	Sets LCD driving voltage bias ratio
(12) Read-Modify-Write	0	1	0	1	1	1	0	0	0	0	0	E0h	Increments column address counter during each write
(13) End	0	1	0	1	1	1	0	1	1	1	0	EEh	Releases the Read-Modify-Write
(14) Reset	0	1	0	1	1	1	0	0	0	1	0	E2h	Resets internal functions
(15) Common Output Mode Select	0	1	0	1	1	0	0	0 1	*	*	*	C0h to CFh	Select COM output scan direction *: invalid data
(16) Power Control Set	0	1	0	0	0	1	0	1	Operation Status			28h to 2Fh	Select the power circuit operation mode
(17) V0 Voltage Regulator Internal Resistor ratio Set	0	1	0	0	0	1	0	0	Resistor Ratio			20h to 27h	Select internal resistor ratio Rb/Ra mode
(18) Electronic Volume mode Set	0	1	0	1	0	0	0	0	0	0	1	81h	
Electronic Volume Register Set	0	1	0	*	*	Electronic Control Value						XX	Sets the V0 output voltage electronic volume register
(19) Set Static indicator ON/OFF	0	1	0	1	0	1	0	1	1	0	0 1	ACh ADh	Sets static indicator ON/OFF 0: OFF, 1: ON
Set Static Indicator Register	0	1	0	*	*	*	*	*	*	Mode		XX	Sets the flash mode
(20) Power Save	0	1	0	-	-	-	-	-	-	-	-	-	Compound command of Display OFF and Entire Display ON
(21) NOP	0	1	0	1	1	1	0	0	0	1	1	E3h	Command for non-operation

Command	A0	/RD	/WR	D7	D6	D5	D4	D3	D2	D1	D0	Hex	Function
(22)Oscillation Frequency Select	0	1	0	1	1	1	0	0	1	0	0 1	E4h E5h	Select the oscillation frequency
(23)Partial Display mode Set	0	1	0	1	0	0	0	0	0	1	0 1	82h 83h	Enter/Release the partial display mode
(24)Partial Display Duty Set	0	1	0	0	0	1	1	0	Duty Ratio			30h 37h	Sets the LCD duty ratio for partial display mode
(25)Partial Display Bias Set	0	1	0	0	0	1	1	1	Bias Ratio			38h 3Fh	Sets the LCD bias ratio for partial display mode
(26)Partial Start Line Set	0	1	0	1	1	0	1	0	0	1	1	D3h	Enter Partial Start Line Set
Partial Start Line Set	0	1	0	1	1	Partial Start Line						XX	Sets the LCD Number of partial display start line
(27)N-Line Inversion Set	0	1	0	1	0	0	0	0	1	0	1	85h	Enter N-Line inversion
Number of Line Set	0	1	0	*	*	*	Number of Line					XX	Sets the number of line used for N-Line inversion
(28)N-Line Inversion Release	0	1	0	1	0	0	0	0	1	0	0	84h	Exit N-Line Inversion
(29)DC/DC Clock Set	0	1	0	1	1	1	0	0	1	1	0	E6h	Set DC/DC Clock Frequency
DC/DC Clock Division Set	0	1	0	1	1	0	0	Clock Division				XX	Set the Division of DC/DC Clock Frequency
(30)Test Command	0	1	0	1	1	1	1	*	*	*	*	F1h to FFh	IC test command. Do not use!
(31)Test Mode Reset	0	1	0	1	1	1	1	0	0	0	0	F0h	Command of test mode reset

3. QUALITY ASSURANCE SYSTEM

3.1   Quality Assurance Flow Chart

Item	Customer	Sales	R&D	Q.A	Manufacturing	Product control	Purchase	Inventory control
Marketing & Design								
Sample Approval								
Pilot Run & Mass Product								
Ship Out								

Info → Survey

Request   Inquiry → Project   evaluation

Project   Validation

NG   OK

Quote

Contract

Design check

Sample test

NG

Verification

NG   OK

Sample approval   OK

Pilot   run & Reliability test

NG

Verification

OK

Specification preparation

Mass production

OK   Inspection   NG

Shipment

Ship out

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Item	Customer	Sales	R&D	Q.A	Manufact uring	Product control	Purchase	Inventory control
Sales Service								
Q.A Activity	1. ISO 9001 Maintenance Activities 2. Process improvement proposal 3. Equipment calibration 4. Education And Training Activities 5. Standardization Management							

Sales Service flow (within the Sales Service row):

Info → Claim → Failure analysis → Analysis report ; Failure analysis → Corrective action → Tracking

3.2. Inspection Specification

◆Scope : The document shall be applied to LCD Module for Monotype and Color STN(Ver. B01).

◆Inspection Standard : MIL-STD-105E Table Normal Inspection Single Sampling Level Ⅱ .

◆Equipment : Gauge、MIL-STD、Powertip Tester、Sample

◆Defect Level :　Major Defect AQL：0.4　;　Minor Defect：AQL：1.5.

◆OUT Going Defect Level : Sampling .

◆Manner of appearance test :

（1）. The test be under 20W×2 fluorescent light ' and distance of view must be at 30 cm.

（2）. Standard of inspection：　(Unit：mm)

（3）. The test direction is base on about around 45°of vertical line.　(Fig. 1)

（4）. Definition of area . (Fig. 2)

B area : Outside of viewing area

eyes　　　eyes

45°　　45°
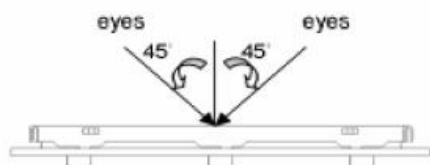
Fig.1
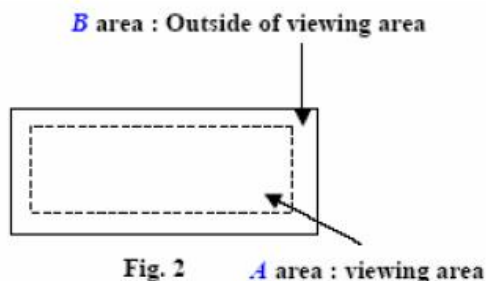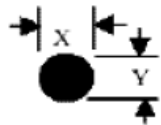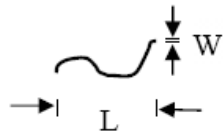
Fig. 2　A area : viewing area

◆ Specification:

NO	Item	Criterion	Level
01	Product condition	1.1 The part number is inconsistent with work order of Production.	Major
		1.2 Mixed production types.	Major
		1.3 Assembled in inverse direction.	Major
02	Quantity	2.1 The quantity is inconsistent with work order of production.	Major
03	Outline dimension	3.1 Product dimension and structure must conform to Structure diagram.	Major
04	Electrical Testing	4.1 Missing line character and icon.	Major
		4.2 No function or no display.	Major
		4.3 Output data is error.	Major
		4.4 LCD viewing angle defect.	Major
		4.5 Current consumption exceeds product specifications.	Major
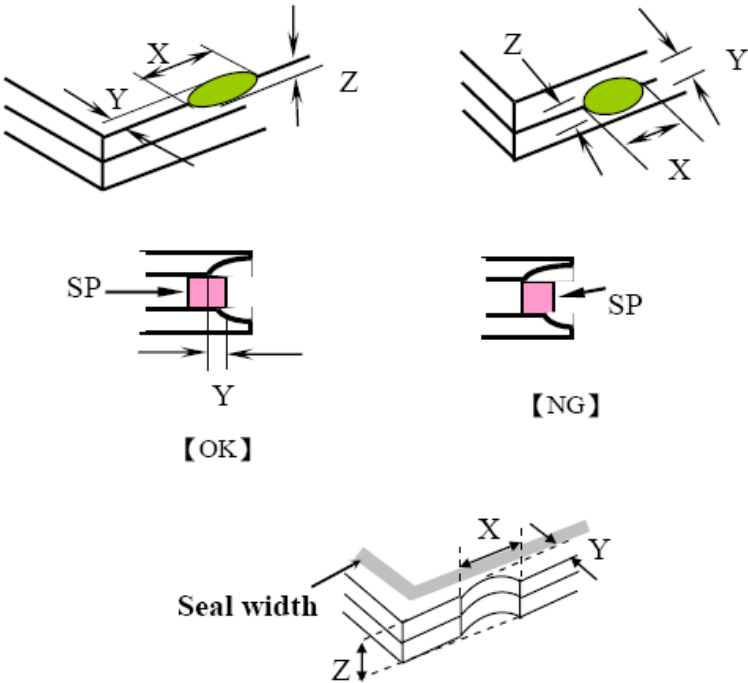
◆Specification For Monotype and Color STN： (Ver. B01)

NO	Item	Criterion	Level
05	**Black or white dot、scratch、contamination** **Round type** Φ=(x+y)/2 **Line type** 	**5.1 Round type:** 　**5.1.1 display only :** 　　• White and black spots on display ≦ 0.30 mm , no more than 4 white or black spots present. 　　• Densely spaced : NO more than two spots or lines within 3 mm. 　**5.1.2 Non-display :** (see table below) 　**5.1.3 Line type:** (see table below)	Minor

5.1.2 Non-display:

Dimension (diameter : Φ)	Acceptance (Q'ty)	
	A area	B area
Φ ≦ 0.10	Accept no dense	Ignore
0.10 ＜ Φ ≦ 0.20	3	
0.20 ＜ Φ ≦ 0.30	2	
Total quantity	4	

5.1.3 Line type:

Dimension		Acceptance (Q'ty)	
Length (L)	Width (W)	A area	B area
---	W ≦ 0.03	Accept no dense	Ignore
L ≦ 3.0	0.03 ＜ W ≦ 0.05	4	
L ≦ 2.5	0.05 ＜ W ≦ 0.075		
---	W ＞ 0.075	As round type	

NO	Item	Criterion	Level
06	**Polarizer Bubble**	(see table below)	Minor

Dimension (diameter : Φ)	Acceptance (Q'ty)	
	A area	B area
Φ ≦ 0.20	Accept no dense	Ignore
0.20 ＜ Φ ≦ 0.50	3	
0.50 ＜ Φ ≦ 1.00	2	
Φ ＞ 1.00	0	
Total quantity	4	
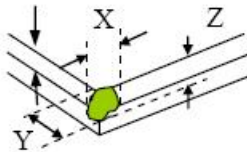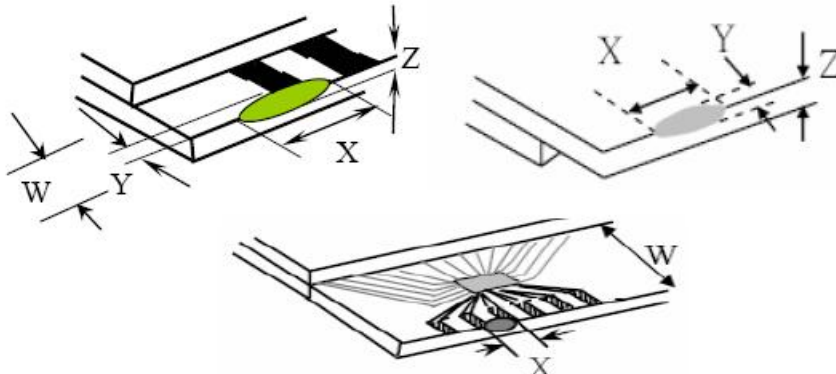
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NO	Item	Criterion	Level
07	The crack of glass	**Symbols：** X : The length of crack　　　Y : The width of crack. Z : The thickness of crack　　W : terminal length t : The thickness of glass　　a : LCD side length 7.1 General glass chip： 7.1.1 Chip on panel surface and crack between panels: 【OK】　　　【NG】 Seal width	Minor

Table within criterion:

X	Y	Z
≦ a	Crack can't enter viewing area	≦1/2 t
≦ a	Crack can't exceed the half of SP width.	1/2 t ＜ Z ≦2 t
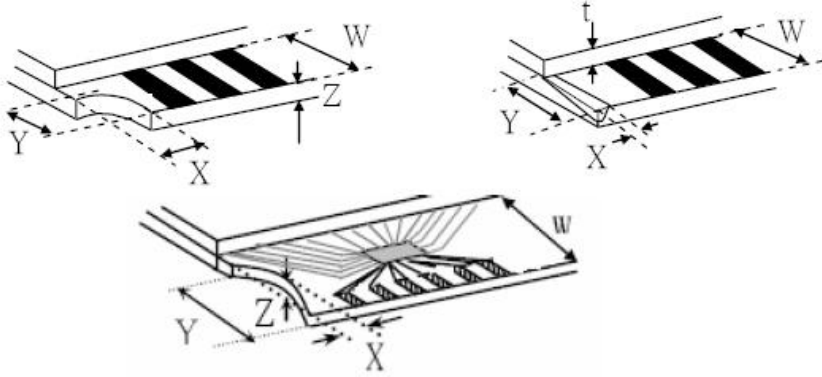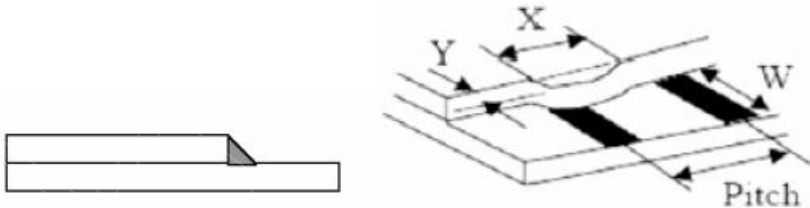
◆Specification For Monotype and Color STN： (Ver. B01)

NO	Item	Criterion	Level
07	The crack of glass	Symbols： **X : The length of crack**　　**Y : The width of crack.** **Z : The thickness of crack**　　**W : terminal length** **t : The thickness of glass**　　**a : LCD side length** --- 7.1.2 Corner crack： 表1 7.2 Protrusion over terminal： 　7.2.1 Chip on electrode pad： 表2	Minor

Table for 7.1.2 Corner crack:

X	Y	Z
≦1/5 a	Crack can't enter viewing area	Z ≦ 1/2 t
≦1/5 a	Crack can't exceed the half of SP width.	1/2 t < Z ≦ 2 t

Table for 7.2.1 Chip on electrode pad:

	X	Y	Z
Front	≦ a	≦ 1/2 W	≦ t
Back	Neglect		

◆Specification For Monotype and Color STN： (Ver. B01)

NO	Item	Criterion	Level
07	The crack of glass	**Symbols：** X : The length of crack Y : The width of crack. Z : The thickness of crack W : terminal length t : The thickness of glass a : LCD side length 7.2.2 Non-conductive portion： | X	Y	Z
---	---	---
≦1/3 a	≦W	≦t | ⊙ If the chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications. 7.2.3 Glass remain： | X	Y	Z
---	---	---
≦ a	≦ 1/3 W	≦ t		Minor

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NO	Item	Criterion	Level
08	Backlight elements	8.1 Backlight can't work normally.	Major
		8.2 Backlight doesn't light or color is wrong.	Major
		8.3 Illumination source flickers when lit.	Major
09	General appearance	9.1 Pin type must match type in specification sheet.	Major
		9.2 No short circuits in components on PCB or FPC.	Major
		9.3 Product packaging must the same as specified on packaging specification sheet.	Minor
		9.4 The folding and peeled off in polarizer are not acceptable.	Minor
		9.5 The PCB or FPC between B/L assembled distance (PCB or FPC) is ≦1.5 mm.	Minor

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4. RELIABILITY TEST

4.1   Reliability Test Condition   (Ver.B01)

NO.	TEST ITEM	TEST CONDITION	
1	**High Temperature Storage Test**	**Keep in +80 ±2℃ 240 hrs** **Surrounding temperature, then storage at normal condition 4hrs.**	
2	**Low Temperature Storage Test**	**Keep in -30 ±2℃ 240 hrs** **Surrounding temperature, then storage at normal condition 4hrs.**	
3	**High Temperature / High Humidity Storage Test**	**Keep in +60 ℃ / 90% R.H duration for 240 hrs** **Surrounding temperature, then storage at normal condition 4hrs.** **(Excluding the polarizer)**	
4	**Temperature Cycling Storage Test**	**-30℃ → +25℃ → +80℃ → +25℃** **(30mins) (5mins) (30mins) (5mins)** **20 Cycle** **Surrounding temperature, then storage at normal condition 4hrs.**	
5	**ESD Test**	**Air Discharge:** **Apply 2 KV with 5 times** **Discharge for each polarity +/-**	**Contact Discharge:** **Apply 250 V with 5 times** **discharge for each polarity +/-**
		1. **Temperature ambiance : 15℃～35℃** 2. **Humidity relative : 30%～60%** 3. **Energy Storage Capacitance(Cs+Cd) : 150pF±10%** 4. **Discharge Resistance(Rd) : 330Ω±10%** 5. **Discharge, mode of operation :** **Single Discharge (time between successive discharges at least 1 sec)** **(Tolerance if the output voltage indication : ±5%)**	
6	**Vibration Test (Packaged)**	1. **Sine wave 10～55 Hz frequency (1 min/sweep)** 2. **The amplitude of vibration :1.5 mm** 3. **Each direction (X、Y、Z) duration for 2 Hrs**	
7	**Drop Test (Packaged)**	<table><tr><td>**Packing Weight (Kg)**</td><td>**Drop Height (cm)**</td></tr><tr><td>**0 ~ 45.4**</td><td>**122**</td></tr><tr><td>**45.4 ~ 90.8**</td><td>**76**</td></tr><tr><td>**90.8 ~ 454**</td><td>**61**</td></tr><tr><td>**0ver 454**</td><td>**46**</td></tr></table>**Drop Direction :※1 corner / 3 edges / 6 sides each 1time**	

5. PRECAUTION RELATING PRODUCT HANDLING

5.1 SAFETY

5.1.1　If the LCD panel breaks , be careful not to get the liquid crystal to touch your skin.

5.1.2　If the liquid crystal touches your skin or clothes , please wash it off immediately by using soap and water.

5.2 HANDLING

5.2.1　Avoid any strong mechanical shock which can break the glass.

5.2.2　Avoid static electricity which can damage the CMOS LSI—When working with the module , be sure to ground your body and any electrical equipment you may be using.

5.2.3　Do not remove the panel or frame from the module.

5.2.4　The polarizing plate of the display is very fragile. So , please handle it very carefully ,do not touch , push or rub the exposed polarizing with anything harder than an HB pencil lead (glass , tweezers , etc.)

5.2.5　Do not wipe the polarizing plate with a dry cloth , as it may easily scratch the surface of plate.

5.2.6　Do not touch the display area with bare hands , this will stain the display area.

5.2.7　Do not use ketonics solvent & aromatic solvent. Use with a soft cloth soaked with a cleaning naphtha solvent.

5.2.8　To control temperature and time of soldering is 320±10℃and 3-5 sec.

5.2.9　To avoid liquid (include organic solvent) stained on LCM .

5.2.10　Caution!(LCM products with Capacitive Touch Panel)
Strong EMI-sources such as switch-mode power supplies (SMPS) can lead to touch malfunction (e.g. ghost-touches).
Therefore, the touch needs to be thoroughly tested inside the target application.

5.3 STORAGE

5.3.1　Store the panel or module in a dark place where the temperature is 25℃ ±5℃ and the humidity is below 65% RH.

5.3.2　Do not place the module near organics solvents or corrosive gases.

5.3.3　Do not crush , shake , or jolt the module.

5.4 TERMS OF WARRANTY

5.4.1　Applicable warrant period
The period is within thirteen months since the date of shipping out under normal using and storage conditions.

5.4.2　Unaccepted responsibility
This product has been manufactured to your company's specification as a part for use in your company's general electronic products. It is guaranteed to perform according to delivery specifications. For any other use apart from general electronic equipment , we cannot take responsibility if the product is used in

nuclear power control equipment , aerospace equipment , fire and security systems or any other applications in which there is a direct risk to human life and where extremely high levels of reliability are required.

LCD MODULE DRAWING

DOTS 128 X 64

ELSCOG12864BKWT-B

SCALE:10X
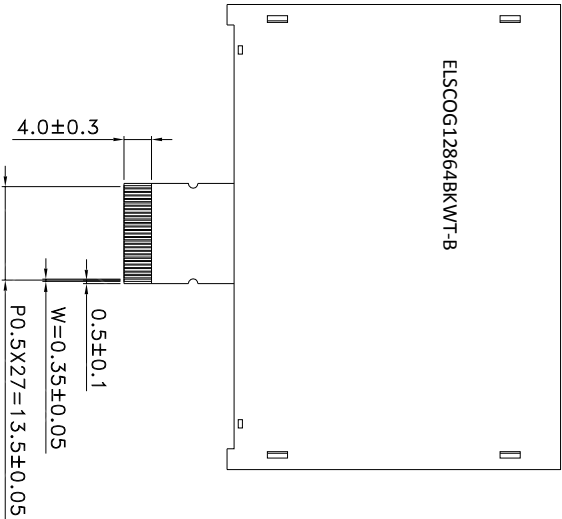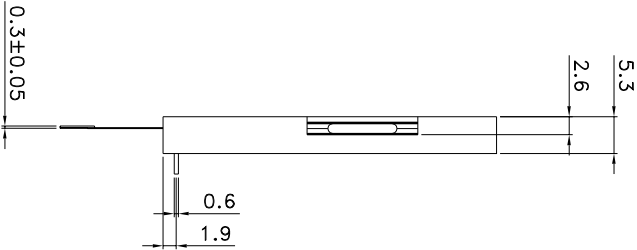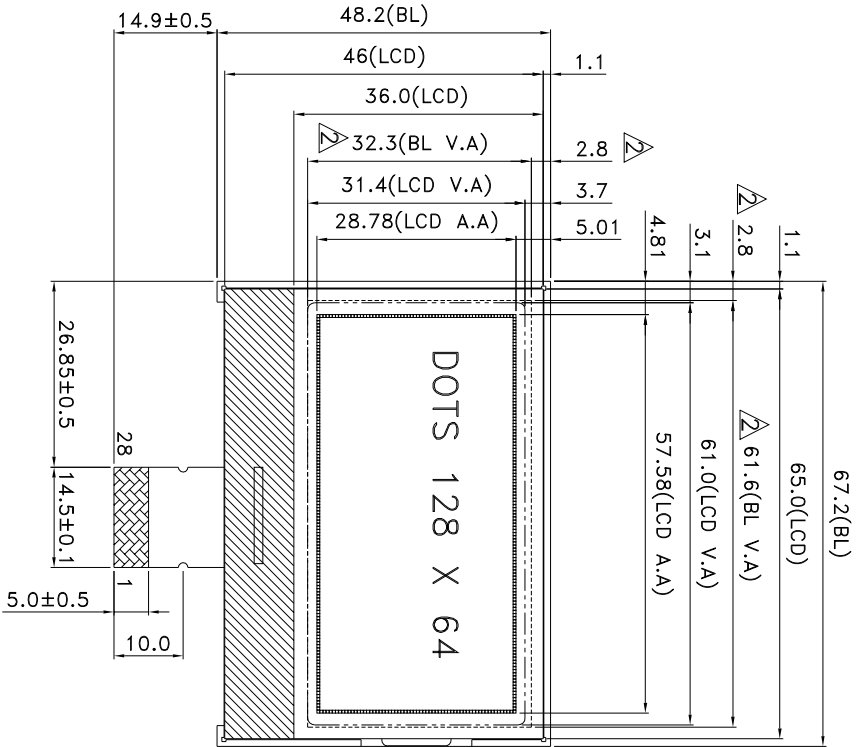
NOTES:
1.LCD TYPE: FSTN
2.LCD DISPLAY: Positive/Transflective
3.VIEW DIRECTION: 6 O'CLOCK
4.The tolerance unless classified ±0.2mm
5.FPC suggested connector : E&T 6702-E28N-00R
or compatible

Dimensions

- 14.9±0.5
- 48.2(BL)
- 46(LCD)
- 36.0(LCD)
- 32.3(BL V.A)
- 31.4(LCD V.A)
- 28.78(LCD A.A)
- 1.1
- 2.8
- 3.7
- 5.01
- 4.81
- 3.1
- 2.8
- 1.1
- 26.85±0.5
- 61.6(BL V.A)
- 61.0(LCD V.A)
- 57.58(LCD A.A)
- 65.0(LCD)
- 67.2(BL)
- 28
- 14.5±0.1
- 5.0±0.5
- 1
- 10.0
- 6.6
- K
- 54.0
- A
- 1.2
- 3.0±0.3
- 0.3±0.05
- 5.3
- 2.6
- 0.6
- 1.9
- 0.45
- 0.43
- 0.45
- 0.43
- 4.0±0.3
- 0.5±0.1
- W=0.35±0.05
- P0.5X27=13.5±0.05

PART NO:			ELSCOG12864BKWT-B			
DRAWING NAME :	Design	Check		Unit	Scale	Material
	Sally	Terry		MM	FIT	
	Approve			Page	Thickness	Quantity
	Ryan			1/1		

TITLE: LCD MODULE DRAWING

REV		REV.BY	REVISER	DATE
001	NEW DRAWING		Sally	2018/01/11
002	Modify BL VA		Sally	2018/09/25
003				
004				
005				
006				
007				

	Lengh(Min) (mm)	Tolerance (mm)	Precision Level
	1 ~ 4	4 ~ 16	-
	16 ~ 63	63 ~ 250	-
	250 ~ 1000	-	-

PT-A-054-01