				F	First Edition Apr 3, 2002
OPTREX	LCD Mod	ule Techi	nical Spe	cification	Final Revision
Type No	F-51168N	ICU-FW-	٩B		
Tab 1. 2. 3. 4. 5. 6. 7. 8. 9. 10 11 <b>Revi:</b> Rev.	le of Content: General Specifications Electrical Specifications I/O Terminal	S S S S S S S S S S S S S S S S S S S	omment	Approved by (Production Checked by (Quality Assu Checked by (Design Engin Prepared by (Production D R Wayn	Div.)
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# 1. General Specifications

Operating Temp.	:	min. 0°C ~ma	ax. 50°C	
Storage Temp.	:	min20°C ~n	nax. 70°C	
Dot Pixels	:	240×3 [R.G.B	B] (W) $ imes$ 64 (H) dots	
Dot Size	:	0.166 (W) × 0	0.52 (H) mm	
Dot Pitch	:	0.176 (W) × 0	0.53 (H) mm	
Viewing Area	:	132.0 (W) × 3	39.0 (H) mm	
Outline Dimensions	:	180.0 (W) × 5	59.6 (H) × 14.0 (D) mm	
Weight	:	135g max.		
LCD Type	:	CTD-17765 ( F-STN / Colo	or-mode / Transmissive)	
Viewing Angle	:	12:00		
Data Transfer	:	8-bit parallel d	data transfer	
Backlight	:	Cold Cathode	Fluorescent Lamp (CFL) $\times$ 1	
Additional Spec.	:	Soldering con	nnects bezel and PWB ground	
Appendix	:	Initialize the re	egisters	
Drawings	:	Dimensional C	Outline UE-300809B	
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# **2.Electrical Specifications**

### 2.1. Absolute Maximum Ratings

					Vss=0V
Parameter	Symbol	Conditions	Min.	Max.	Units
Supply Voltage	Vcc1-Vss	-	-0.3	6.0	V
	Vcc2-Vss				
Supply Voltage	VCONT-VSS	-	-0.3	6.0	V
(Contrast)					
Input Voltage	Vı	-	-0.3	Vcc1	V

## 2.2. DC Characteristics

					Ta=25°C	Vss=0V
Parameter	Symbol	Conditions	Min.	Тур.	Max.	Units
Supply Voltage	Vcc1-Vss	-	4.5	5.0	5.5	V
	Vcc2-Vss					
Supply Voltage	Vcont-Vss	-	2.4	2.5	2.6	V
(Contrast)						
High Level	Vін	Vcc1=5.5V	2.0	-	-	V
Input Voltage						
Low Level	VIL	Vcc1=4.5V	-	-	0.8	V
Input Voltage						
High Level	Vон	lон=-8mA	Vcc1-0.4	-	-	V
Output Voltage		Apply toDB0~DB15				
Low Level	Vol	lol=8mA	0	-	0.4	V
Output Voltage		Apply to B0~DB15				
High Level	Vон	loн=-12mA	Vcc1-0.4	-	-	V
Output Voltage		Apply to READY				
Low Level	Vol	loL=12mA	-	-	0.4	V
Output Voltage		Apply to READY				
Frequency	fosc	-	-	3	-	MHz
Supply Current	lcc	Vcc1-Vss=5.0V	-	40	60	mA
	Note1	Vcc2-Vss=5.0V				

Note1:lcc=lcc1+lcc2

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#### 2.3.AC Characteristics

2.3.1. Read/Write Operation Sequence (Non-MC68000)

READ			Vcc	1=4.5~5.5V
Parameter	Symbol	Min.	Max.	Units
AB[15:0] and $\overline{IOCS}$ valid before $IORD\downarrow$	t1	0	-	ns
AB[15:0] and IOCS hold from IORD↑	t <sub>2</sub>	10	-	ns
$\overline{IORD}\downarrow$ to DB[7:0] valid	t₃	-	40	ns
DB[7:0] hold from IORD↑	t4	-	15	ns
IORD↑ to DB[7:0] Hi-z delay	t₅	-	25	ns





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### 2.3.3. SRAM Access Time

8-bit Display Memory Interface	fosc=3MHz
Display Mode	Access time
16-level colors	Access time $\leq$ 1/fosc-25ns
4-level colors	Access time ≤ 2/fosc-25ns
Black-and-White(BW)	Access time ≤ 2/fosc-25ns

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# 3.Optical Specifications

3.1. Optical Characteristics

	Ta=25°C, 1/64 Duty, 1/9 Bias, VoD=14.0V (Note 4), θ= 0°C, φ=-°						
Parameter		Symbol	Conditions	Min.	Тур.	Max.	Units
Contrast Ra	atio Note 1	CR	$\theta$ = 0°C , $\phi$ =-°	-	40	-	
Chromaticity (white)		х	-	0.273	0.303	0.333	
	Note 2	у	-	0.311	0.341	0.371	
Viewing Angle				Shown i	n 3.3		
Response	Rise Note 3	Ton	-	-	140	210	ms
Time	Decay Note 4	TOFF	-	-	100	200	ms

Note 1 :Contrast ratio is definded as follows. (CR = LON / LOFF)

LON : Luminance of the ON segments

 $\ensuremath{\mathsf{LOFF}}$  : Luminance of the OFF segments

Note 2 :Chromaticity at Backlight Sarface : x=0.345,y=0.330

Note 3 :The time that the luminance level reaches 90% of the saturation level from 0% when ON signal is applied.

Note 4 :The time that the luminance level reaches 10% of the saturation level from 100% when OFF signal is applied.

Note 5 :Definition of Driving Voltage VoD

Assuming that the typical driving waveforms shown below are applied to the LCD Panel at 1/A Duty - 1/B Bias (A: Duty Number, B: Bias Number). Driving voltage VoD is definded as the voltage VO-P when the contrast ratio (CR=LON / LOFF) is at its maximum.



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# 4.I/O Terminal

4.1. Pin Assignment

<u>CN1</u>

No.	Symbol		Function	
1	FG	Frame GND		
2	Vss	Power Supply(0V,	GND)	
3	Vss	Power Supply(0V,	GND)	
4	Vcc1	Power Supply for	Logic	
5	Vcc1	Power Supply for	Logic	
6	Vcc2	Power Supply for I	LCD	
7	Vcc2	Power Supply for I	LCD	
8	Vcont	Voltage Level for L	CD Contrast Adjustment	
9	IOCS	Control Register C	Chip Select Signal L : Active	
10	IOWR	Control Register V	Vrite Signal L : Active	
11	IORD	Control Register R	ead Signal L : Active	
12	MEMCS	Memory Chip Sele	ect Signal L : Active	
13	MEMWR	Memory Write Sig	nal L : Active	
14	MEMRD	Memory Read Sig	nal L : Active	
15	READY	Ready Signal		
16	RESET	Reset Signal H :	Reset	
17	AB0	Address Bus Line		
18	AB1	Address Bus Line		
19	AB2	Address Bus Line		
20	AB3	Address Bus Line		
21	AB4	Address Bus Line		
22	AB5	Address Bus Line		
23	AB6	Address Bus Line		
24	AB7	Address Bus Line		
25	AB8	Address Bus Line		
26	AB9	Address Bus Line		
27	AB10	Address Bus Line		
28	AB11	Address Bus Line		
29	AB12	Address Bus Line		
30	AB13	Address Bus Line		
31	AB14	Address Bus Line		
32	AB15	Address Bus Line		
33	DB0	Data Bus Line		
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34	DB1	Data Bus Line
35	DB2	Data Bus Line
36	DB3	Data Bus Line
37	DB4	Data Bus Line
38	DB5	Data Bus Line
39	DB6	Data Bus Line
40	DB7	Data Bus Line

CN2

No.	Symbol	Function
1	VR	CFL Compensation Terminal (10k $\Omega$ )
2	VR(G)	CFL Compensation Terminal (G)
3	GND	Power Supply for CFL Inverter (GND)
4	VIN(12V)	Power Supply for CFL Inverter(+12V)

## 4.2. Example of Power Supply

It is recommended to apply a potentiometer for the contrast adjust due to the tolerance of the driving voltage and its temperature dependence.



R1+R2+VR=10~ 20KΩ

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## <u>5.Test</u>

No change on display and in operation under the following test condition.

Conditions: Unless otherwise specified, tests will be conducted under the following condition. Temperature: 20±5°C Humidity : 65±5%RH tests will be not conducted under functioning state.

No.	Parameter	Conditions	Notes
1	High Temperature Operating	50°C±2°C, 96hrs (operation state)	
2	Low Temperature Operating	0°C±2°C, 96hrs (operation state)	1
3	High Temperature Storage	70°C±2°C, 96hrs	2
4	Low Temperature Storage	-20°C±2°C, 96hrs	1,2
5	Damp Proof Test	40°C±2°C,90~95%RH, 96hrs	1,2
6	Vibration Test	Total fixed amplitude : 1.5mm	3
		Vibration Frequency : 10~55Hz	
		One cycle 60 seconds to 3 directions of X, Y, Z for	
		each 15 minutes	
7	Shock Test	To be measured after dropping from 60cm high on	
		the concrete surface in packing state.	
		E       G       C       B       C       E       G       0       C       No       No <td< td=""><td></td></td<>	

Note 1 :No dew condensation to be observed.

Note 2 :The function test shall be conducted after 4 hours storage at the normal

Temperature and humidity after removed from the test chamber.

Note 3 :Vibration test will be conducted to the product itself without putting it in a container.

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# 6.Appearance Standards

### 6.1. Inspection conditions

The LCD shall be inspected under 40W white fluorescent light.

The distance between the eyes and the sample shall be more than 30cm.

All directions for inspecting the sample should be within 45° against perpendicular line.



6.2. Definition of applicable Zones



A Zone : Active display area

B Zone : Area from outside of "A Zone" to validity viewing area

C Zone : Rest parts

A Zone + B Zone = Validity viewing area

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No.	Parameter			Criteria			
1	Black and	(1) Round Shape					
	White Spots,		Zone	Acceptable Number			
	Foreign Substances	Dimension (	mm)	А	В	С	
		D	≤0.1	*	*	*	
		0.1 < D	≤0.2	3	5	*	
		0.2 < D	≤0.3	2	3	*	
		0.3 < D	≤0.35	0	1	*	
		0.35< D		0	0	*	
		D = ( Long	+ Short ) / 2	* : Disregar	d		
		(2) Line Shape					
			Zone	Aco	ceptable Num	ber	
		X (mm) X	(mm)	А	В	С	
		-	0.03≥ W	*	*	*	
		2.0 ≥ L	0.05≥ W	4	4	*	
		1.0 ≥ L	0.1 ≥ W	4	4	*	
		-	0.1 < W	In t	he same way	(1)	
		X : Length Y : Width * : Disregard					
		Total defects shall not exceed 7.					
2 Air Bubbles							
	(between glass		Zone	Aco	ceptable Num	ber	
	& polarizer)	Dimension (	mm)	А	В	С	
		D	1, D2 ≤ 0.3	*	*	*	
		0.3 < D1	l, D2 ≤ 0.5	3	*	*	
		0.5 < D1	≤ 0.7	2	3	*	
		0.5 < D2	2 ≤ 0.6	2	3	*	
		0.7 < D1	l, 0.6 ≤ D2	0	0	*	
		D1 : Small foam a gathering D2 : Single fo			gle foam *:	n *: Disregard	
		Total defects shall not exceed 5.				-	
3	The Shape of Dot	However, each pixel shall remain more than one-third of the original					
		pixel size.				-	
4	Polarizer Scratches	Not to be cons	picuous defe	cts.			
5	Polarizer Dirts	If the stains are	e removed ea	sily from LCD	P surface, th	e module is	
		not defective.					
6	Complex Foreign	Black spots, line shaped foreign substances or air bubbles between					
	Substance Defects	glass & polarizer should be 7pcs maximum in total.					
7	Distance between	$D \le 0.2$ : 20mm or more					
	Different Foreign	0.2 < D : 40mm or more					
	Substance Defects						



## 10.Precautions Relating Product Handling

The Following precautions will guide you in handling our product correctly.

- 1) Liquid crystal display devices
- 1. The liquid crystal display device panel used in the liquid crystal display module is made of plate glass. Avoid any strong mechanical shock. Should the glass break handle it with care.
- 2. The polarizer adhering to the surface of the LCD is made of a soft material. Guard against scratching it.
- 2) Care of the liquid crystal display module against static electricity discharge.
- 1. When working with the module, be sure to ground your body and any electrical equipment you may be using. We strongly recommend the use of anti static mats (made of rubber), to protect work tables against the hazards of electrical shock.
- 2. Avoid the use of work clothing made of synthetic fibers. We recommend cotton clothing or other conductivity-treated fibers.
- 3. Slowly and carefully remove the protective film from the LCD module, since this operation can generate static electricity.
- 3) When the LCD module alone must be stored for long periods of time:
- 1. Protect the modules from high temperature and humidity.
- 2. Keep the modules out of direct sunlight or direct exposure to ultraviolet rays.
- 3. Protect the modules from excessive external forces.
- 4) Use the module with a power supply that is equipped with an overcurrent protector circuit, since the module is not provided with this protective feature.
- Do not ingest the LCD fluid itself should it leak out of a damaged LCD module. Should hands or clothing come in contact with LCD fluid, wash immediately with soap.
- 6) Conductivity is not guaranteed for models that use metal holders where solder connections between the metal holder and the PCB are not used. Please contact us to discuss appropriate ways to assure conductivity.
- 7) For models which use CFL:
- 1. High voltage of 1000V or greater is applied to the CFL cable connector area. Care should be taken not to touch connection areas to avoid burns.
- 2. Protect CFL cables from rubbing against the unit and thus causing the wire jacket to become worn.
- 3. The use of CFLs for extended periods of time at low temperatures will significantly shorten their service life.
- 8) For models which use touch panels:
- 1. Do not stack up modules since they can be damaged by components on neighboring modules.
- 2. Do not place heavy objects on top of the product. This could cause glass breakage.
- 9) For models which use COG,TAB,or COF:
  - 1. The mechanical strength of the product is low since the IC chip faces out unprotected from the rear.
  - Be sure to protect the rear of the IC chip from external forces.
  - 2. Given the fact that the rear of the IC chip is left exposed, in order to protect the unit from electrical damage, avoid installation configurations in which the rear of the IC chip runs the risk of making any electrical contact.

10)Models which use flexible cable, heat seal, or TAB:

- 1. In order to maintain reliability, do not touch or hold by the connector area.
- 2. Avoid any bending, pulling, or other excessive force, which can result in broken connections.
- 11) In case of buffer material such as cushion / gasket is assembled into LCD module, it may have an adverse effect on connecting parts ( LCD panel-TCP / HEAT SEAL / FPC / etc., PCB-TCP / HEAT SEAL / FPC etc., TCP-HEAT SEAL, TCP-FPC, HEAT SEAL-FPC, etc.,) depending on its materials.
  Descent advects these materials.

Please check and evaluate these materials carefully before use.

12)In case of acrylic plate is attached to front side of LCD panel, cloudiness (very small cracks) can occur on acrylic plate, being influenced by some components generated from polarizer film.. Please check and evaluate those acrylic materials carefully before use.

## 11.Warranty

This product has been manufactured to your company's specifications 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 medical devices, 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. If the product is to be used in any of the above applications, we will need to enter into a separate product liability agreement.

- 1. We cannot accept responsibility for any defect, which may arise from additional manufacturing of the product (including disassembly and reassembly), after product delivery.
- 2. We cannot accept responsibility for any defect, which may arise after the application of strong external force to the product.
- 3. We cannot accept responsibility for any defect, which may arise due to the application of static electricity after the product has passed your company's acceptance inspection procedures.
- 4. When the product is in CFL models, CFL service life and brightness will vary according to the performance of the inverter used, leaks, etc. We cannot accept responsibility for product performance, reliability, or defect, which may arise.
- 5. We cannot accept responsibility for intellectual property of a third party, which may arise through the application of our product to your assembly with exception to those issues relating directly to the structure or method of manufacturing of our product.
- 6. Optrex will not be held responsible for any quality guarantee issue for defect products judged as Optrex-origin longer than 2 (two) years from Optrex production or 1(one) year from Optrex, Optrex America, Optrex Europe, Display LC delivery which ever comes later.

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