LCD Module Technical Specification

Part No: **MG 830NYU-LY**

Crystal
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1.0   General Description

The MG830NYU-LY is a compact LCD module capable of displaying graphics and characters. It has been developed specially for instrumentation applications. The module has the following features:

Display Format	240 (L) x 64 (W) Dots
LCD Type	STN, Yellow-Green
Display Mode	Positive, Transflective
Driving Method	1/64 Duty Cycle, 1/9 Bias
Viewing Direction	12 O'clock
LCD Controller LSI	T6963C (Toshiba) / SAP1024B (Avant)
Backlighting	Yellow-Green LED
Operating Temperature	min. 0°C to max. +60°C
Storage Temperature	min. -10°C to max. +70°C

2.0   Product Specifications

2.1 Mechanical Data

Item	Specifications	Unit
Outline Dimensions	180.0 (L) x 65.0 (B) x 16.6(H) max	mm
Viewing Area	132.0 (L) x 39.0 (B)	mm
Number Of Dots	240 x 64 dots	-

2.2 Absolute Maximum Ratings

Unless otherwise specified, VSS= 0V

Item	Symbol	Condition	Min.	Max.	Unit
Supply Voltage (Logic)	$V_{CC}-V_{SS}$	-	0	6.5	V
Supply Voltage (LCD Drive)	V_{LCD}	-	0	12.3	V
Input Voltage	V_I	-	0	V_{CC}	V

2.3 Electrical Characteristics

Unless otherwise specified, Vss (GND) = 0V, Ta = 25°C

Item	Symbol	Min.	Typ.	Max.	Unit
Logic Voltage	$V_{DD}-V_{SS}$	4.75	5.0	5.25	V
Logic Current (Note 1)	I_{DD}	-	12.5	-	mA
Contrast Adjust Voltage (Note 2)	V_O-V_{SS}	-8.0	-9.0	-10.0	V
Contrast Adjust Current (Note 1)	I_O	-	-3.0	-5.0	mA
V_{IN} High (Note 3)	V_{IH}	$V_{DD}-2.2$	-	V_{DD}	V
V_{IN} Low (Note 3)	V_{IL}	0	-	0.8	V
Backlight Wave Length	●	565	570	575	nm
Backlight Forward Voltage	V_{LED}	11.0	12.0	12.9	V
Backlight Forward Current	I_F	80	100	120	mA
Luminous Intensity (Note 4)	L	-	12	-	cd/m^2

Note 1: The display pattern is all pixels 'ON'.
Note 2: Contrast adjust voltage may fluctuate ±0.5V by each module.
Note 3: Apply to terminals WR, RD, CE, C/D, RST, FS, D0~D7.
Note 4 : Luminous intensity is directly measured on module LCDP surface.

2.4 Optical Characteristics

2.4.1.   LCD Driving Voltage

Item	Symbol	Condition	Temp.	Min.	Typ.	Max.	Unit
Recommended LCD Driving Voltage	$V_{CC}-V_{EE}$	$\theta=10°$, $\phi=0°$	25°C	11.9	12.1	12.3	V

2.4.2. Optical Characteristics

V_{LCD} = 12.1V, 1/64 Duty, 1/9 Bias, 70Hz

Item		Symbol	Condition	Temp.	Min.	Typ.	Max.	Unit
Contrast Ratio (Note 1)		CR	θ =10°, ϕ = 0°	25°C	–	12.0	–	–
Viewing Angle (CR ≥ 2)		θ	ϕ = 0°	25°C	39	44	–	°
Response Time	Rise	T_{ON}	θ =10°, ϕ = 0°	25°C	100	150	300	ms
	Decay	T_{OFF}		25°C	100	150	250	

Note 1 : Contrast ratio is defined as follows :
$$CR = L_{OFF} / L_{ON}$$
L_{ON} = Luminance of the ON segments
L_{OFF} = Luminance of the OFF segments

2.5 Pin Assignments

Note : on the drawing containing interface pins, the table below also apply.

No.	Symbol	Level	Function
1	FG	-	Frame Ground
2	GND	-	Power Supply (Vss, 0V)
3	VDD	-	Power Supply for Logic +5v
4	Vo	-	Negative Voltage for LCD contrast adjustment
5	WR	L	Write Signal ("L" active)
6	RD	L	Read Signal ("L" active)
7	CE	L	Chip Enable Signal ("L" active)
8	C/D	H/L	Write Mode H: Command L: Data Write Read Mode H: Status Read L: Data Read
9	NC	-	No Connection
10	RESET	-	Reset Signal ("L" Reset)
11	D0	H/L	8-bit Data
12	D1	H/L	
13	D2	H/L	
14	D3	H/L	
15	D4	H/L	
16	D5	H/L	
17	D6	H/L	
18	D7	H/L	
19	FS	H/L	Font Switch VDD = 6 x 8 dots Vss = 8 x 8 dots
20	NC	-	No Connection

3.0 Interface Control

Please refer to the Controller IC T6963C (TOSHIBA) / SAP1024B (AVANT) data book for details of command and interface control for LCD display.

4.0 Reliability Specifications

41 Test Specimen

Unless otherwise specified, two specimens shall be taken from a normal production lot and subject to each of the tests specified herein.

4.2 Acceptance Criteria

Test specimens shall not exhibit any sign of uneven contrast, flickering, missing, shorted pixels or unusual patterns for the entire duration of the auto cycle test pattern.

4.3 Reliability Test Description

4.3.1 Test Condition

- Unless specified otherwise, test will be conducted under the following condition:

  Temperature : $20 \pm 5\ °C$

  Humidity   : $65 \pm 5\%$

- Unless otherwise specified, test specimens shall be in Operational State during all tests meaning power and signals shall be applied.

  An auto cycle test pattern routine shall be applied to the test specimens.
  The pattern include all dots on, even dots on, odd common on, even segment on and odd segment on.

- Unless specified otherwise, test will be conducted to the product itself without putting in a container.

- In case of related to deterioration such as shock test, it will be conducted only once.

4.3.2 Four - Corner Environmental Stress Test

Test specimens shall be subjected to a 4 states environmental stress test as follows :

- State 1:   0 ± 2°C,
- State 2: +60 ± 2°C, 20 ± 5% RH
- State 3:   0 ± 2°C,
- State 4: +60 ± 2°C, 80 ± 5% RH

Each state shall last 96 hours including ramp-up/down periods not less than 1 hour each.

4.3.3 Storage Test

High temperature storage : Function test shall be conducted after storage 96 hours in the non-operational state at +70°C ± 2°C, and 4 hours storage at normal temperature and humidity (65 ± 5 % RH).

Low temperature storage : Function test shall be conducted after storage 96 hours in the non-operational state at -10°C ± 2°C, and 4 hours storage at normal temperature and humidity (65 ± 5% RH).

4.3.4 Damp Proof Test

Condition +40°C ± 2°C, 90~95%RH, 96 hours (non-operation state)
No dew condensation to be observed.
Returned under normal temperature and humidity for 5 hours.

4.3.5. Vibration Test

Test specimens shall be subjected to vibration as follows:

- Amplitude: 1.5 mm
- Frequency: Sweeping from 10 Hz to 55 Hz and then back to 10 Hz
- No. Of Cycles: one cycle 60 sec. To 3 directions of X, Y, Z for each 15 min.

- Mounting: Test specimens are to be secured to the vibrating table via the appropriate fasteners at the 4 corners of the test specimens.

4.3.6 Drop Test

The quantity of test specimens shall be the maximum prescribed per the designated packing carton. Each test specimen shall be packed in its respective prescribed packaging medium and in accordance to the prescribed Packaging Instructions X-830-XX.
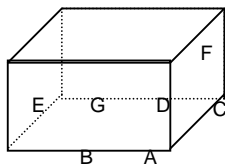
The packed specimens shall be dropped once on:

Corner: A

Edge: B, C, D

Face: E, F, G

- Height of drop 60 cm onto concrete floor

After the completion of all 7 drops, all specimens shall be subjected to 100% mechanical inspection, followed by 5 cycles of the auto cycle test pattern routine.

5.0   Inspection Specifications

5.1   Inspection Level

This section specifies failure criteria, and failure ate for the LCD Assembly. The methods of determine the MTBF and the failure rate is to be established. All series production LCD assembly shall be tested 100% prior to shipment for further processing. The LCD assembly shall be considered a failing unit when it no longer meets any of the requirements stated in this specification.

The display assembly shall be considered a failing unit when any one of the following occur:

- The back light output drops down to 60% luminance (FOS) of the initial value.
- Any screen defects which belong to the failure of the LCD electrical circuitry.
- Any lead or wire breaking caused by corrosion and of mechanical/thermal shock.
- Wire/cables/connectors/glass plates failure in any manner affecting form, fit

function or reliability.

- Bad viewing angle in wrong position.

- Segment shorts (automatic test).

- Unreliable contacts (flickering of entire display or of individual segments).

| Class	Contents	AQL %
Critical Defects	No display Turn On, Inappropriate SEG Turn On, Functional Defect	.25
Major Defects	Electrical, optical, mechanical parameters out of specs without affecting functions.	1
Minor Defects	Black spots, Foreign substances, Pin hole segment, Deformation, Scratches (polarizer), Air Bubbles between glass & polarizer, Colour variations, Polarizer dirt, Other visual defects.	2.5

5.2   *Appearance Standards*

1) Inspection Conditions

The module shall be inspected under 40 W white fluorescent light. The distance between the eyes and the sample shall be 30 cm. All directions for inspecting the samples should be within 45° against the vertical of the LCD.
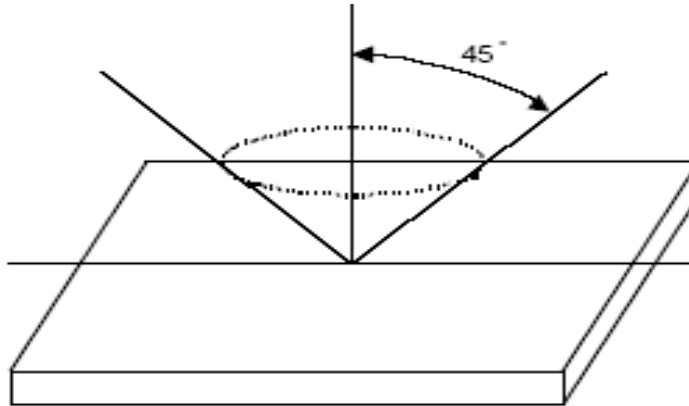
2) Appearance Specifications

Bezel Frame
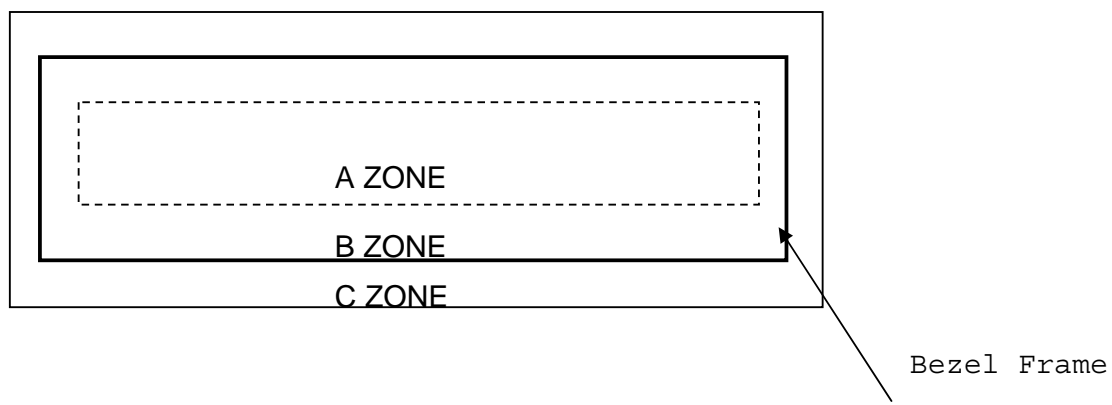
a) A ZONE: active display area,

b) B ZONE: area from outside of "A ZONE" to insight edge of metal holder,

c) C ZONE: rest parts.

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A Zone + B Zone = Validity viewing area
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No.	Item	Criteria			Category
1	Spots / Dust / Bubble (Round type)	Size, D (mm)	Acceptable Qty. in Active Area		Minor
		D ≤ 0.15	Disregard		
		0.15 < D ≤ 0.20	3		
		D > 0.20	0		
2	Dust / Scratches / Black Streak (Line type)	Width, W (mm)	Length, L (mm)	Acceptable Qty. in Active Area	Minor
		W ≤ 0.02	Disregard	Disregard	
		W ≤ 0.03	L ≤ 1.0	Disregard	
		W ≤ 0.05	L ≤ 2.0	3	
		W > 0.05	Disregard	0	
3	Allowable Density	Above defects should be separated more than 5mm each other.			Minor
4	Rainbow	Obvious uneven color (rainbow) shall not be noticeable.			Minor
5	Display Condition	Dim display on the patterns, extra pattern and short circuit are not acceptable.			Major
6	No Display / Missing Display	The patterns of display shall light up as required. No display or missing display are not acceptable.			Major

Note : D = (long length + short length) / 2

6.0   Precautions for Use of LCD Module

6.1   Handling Precautions

The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place.

If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth. If the substance comes into contact with your skin or clothes, please immediately wash it off using soap and water.

Do not apply excessive force on the surface of display or the adjoining areas of LCD module since this may cause the colour tone or vary.

To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

- Please be sure to ground human body and electric appliances during work.
- It is preferable to use conductive mat on table and wear cotton clothes or conduction processed fiber.
- Slowly peel off protective film since static electricity may be generated.

6.2   Storage Precautions

When storing the LCD module, avoid exposure to direct sunlight or to the light of fluorescent lamps. Keep the LCD module in bags provided to prevent static electricity charging under low temperature (0 °C to 25 °C) / normal humidity conditions (avoid high temperature / high humidity and low temperature below 0 °C).

If storage condition is not satisfactory, display (especially polarizer) may be deteriorated or soldering I/O terminals may become difficult (some oxide is generated at I/O terminals plating).

6.3 Design Precautions

The absolute maximum ratings represent the rated value beyond which LCD module cannot exceed. When LCD module are used in excess conditions, their operating characteristics may be adversely affected.

The liquid crystal display exhibits temperature dependency characteristics, be sure to use the LCD module within the specified range.

To prevent the occurrence of erroneous operation caused by noise, attention must be paid to satisfy the V_{IL}, V_{IH} specification values.

7.0 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. 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.

5. Optrex will not be held responsible for any quality guarantee issue for defect products judged as Optrex-origin longer than two years from Optrex production or one year from Optrex, Optrex America, Optrex Europe delivery which every comes later.