

# NAN YA PLASTICS CORPORATION

---

SPECIFICATION OF  
LCD MODULE  
PRODUCT NO.: LCBKET302MCT

SPEC. NO.: LM302-0-<sup>△</sup>1

CUSTOMER
APPROVED BY
DATE:

LCD DEPARTMENT  
ELECTRONIC MATERIALS DIVISION  
NAN YA PLASTICS CORPORATION  
201, TUNG HWA N. ROAD, TAIPEI  
TEL: 886-2-27122211 EXT. 5993~5995  
FAX: 886-2-27178253  
E-mail: lcdsales@npc.com.tw

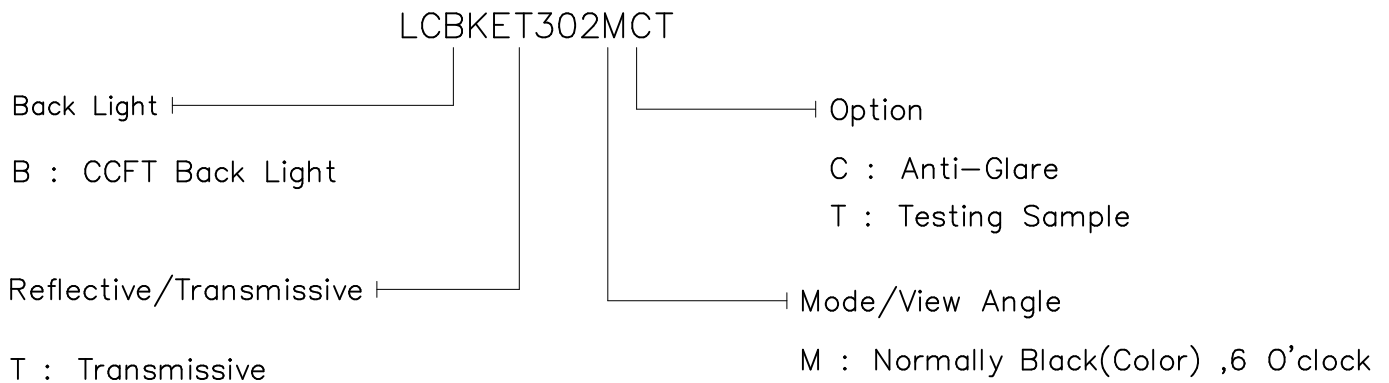
DESIGN MANAGER	DESIGN CHECK	DESIGNER



# 1. MECHANICAL DATA

(1) Product No.	LCBKET302MCT
(2) Module Size	197.0 (W)mm x 145.0 (H)mm x 10.26 (D)mm
(3) Bezel Opening Area	158.0 (W)mm x 118.0 (H)mm
(4) Dot Size	0.064 (W)mm x 0.222 (H)mm
(5) Dot Pitch	0.079 (W)mm x 0.237 (H)mm
(6) Number of Dots	640 (W)xR.G.B x 480 (H)DOTS
(7) Duty	1/484
(8) LCD	Glare/Color Transmissive Type
(9) Viewing Direction	6 O'clock
(10) Backlight	CCFL
(11) Controller	Excluded
(12) DC/DC Converter	Excluded
(13) Touch Panel	Nonglare (3H Min.)
(14) Weight	400 g(approx.)

Note :



## 2. ABSOLUTE MAXIMUM RATINGS

### (1) ELECTRICAL ABSOLUTE RATINGS

VSS=0V

ITEM	SYMBOL	MIN	MAX	UNIT	COMMENT
Power Supply for Logic	VDD-VSS	-0.3	7.0	V	
Power Supply for LCD Drive	VEE-VSS	0	42.0	V	
Input Voltage	VI	VSS-0.3	VDD+0.3	V	
Static Electricity	-	-	-	-	Note 1

Note 1 LCM should be grounded during handling LCM.

### (2) ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	NORMAL TEMP.			
	OPERATING		STORAGE	
	MIN.	MAX.	MIN.	MAX.
Ambient Temperature	0	50	-20	70
Humidity (Without Condensation)	Note 2,4		Note 3,4	
Vibration	Note 5			

Note 2  $T_a \leq 50^\circ\text{C}$  : 85%RH max

$T_a > 50^\circ\text{C}$  : Absolute humidity must be lower

than the humidity of 85%RH at  $50^\circ\text{C}$

Note 3  $T_a$  at  $-20^\circ\text{C}$  will be < 48 hrs, at  $70^\circ\text{C}$  will be < 120 hrs

Note 34 Background color changes slightly depending on ambient temperature.

This phenomenon is reversible.

Note 5

Frequency	5 Hz~13.95 Hz	13.95 Hz~33 Hz	33 Hz~51 Hz	51 Hz~500 Hz
Vibration Level	-	2X9.8 m/s <sup>2</sup>	-	5x9.8 m/s <sup>2</sup>
Vibration Width	0.2 inch	-	0.036 inch	-
Vibration Direction	X/Y/Z			
Vibration Time	20 min-1cyc le X 3 directions			

### 3. ELECTRICAL CHARACTERISTICS

#### 3.1 ELECTRICAL CHARACTERISTICS OF LCM

ITEM	SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT
Logic Circuit Power Supply	VDD-VSS	Ta= 25°C		2.7	3.0	3.3	V
				4.5	5.0	5.5	V
Input Voltage	VIH	H level		0.8VDD	-	VDD	V
	VIL	L level		0	-	0.2VDD	V
Recommended LCD Contrast Adjust Voltage	VEE-VSS	f <sub>FLM</sub> =120Hz Duty=1/484 Bias=1/14 VDD=3.3V	0°C	37.1	37.5	37.9	V
			25°C	36.1	36.5	36.9	
			50°C	35.2	35.6	36.0	
Supply Current for Logic	IDD	VDD-VSS = 3.3V		-	16.0	24.0	mA
Supply Current for LCD	IEE	VEE-VSS = 36.5V Ta= 25°C		-	8.0	12.0	mA

3.1.1 CHARACTERISTICS OF TOUCH SCREEN

3.1.1.1 ELECTRICAL AND MECHANICAL TERMS

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Applied Rating Voltage	$V_R$	—	—	—	5.0	V
Applied Rating Current	$I_R$	At Contact Point of Top Layer with Bottom Layer	—	—	1.0	mA
Operating Temperature	$T_{OPR}$	20%~85% R.H. Max. Avoid Dew Condensation at Any Time	-10	—	60	°C
Storage Temperature	$T_{STO}$		-20	—	70	
Resistance of Terminal Electrodes	$R_{ETD}$	X Electrode	260	580	1060	Ω
		Y Electrode	155	350	640	
Linearity	L	—	—	—	1.5	%
Insulation Resistance	$R_{OFF}$	$V_{DC} = 25V$	20	—	—	MΩ
Activation Force	$F_{ON}$	NOTE 1	10	—	80	g
Transparency	T	According to JIS-K7015	—	83	—	%
Surface Hardness	$S_H$	According to JIS-K5400	3	—	—	H

NOTE 1 : The force is given with R0.8 Polyacetal pen or R3, HS60 silicon rubber and the analog output could be detected stably.

3.1.1.2 RELIABILITY TERMS

ITEM	SPECIFICATION
Exposure to High Temperature	70°C, 120 Hours
Exposure to Low Temperature	-40°C, 120 Hours
Exposure to Constant Temperature and Humidity	60°C 90%RH, 120 Hours
Repetition of High and Low Temperatures	-10°C(60Minutes) --- 60°C(60Minutes) 20 Cycles   1 Cycle
Finger Touches Life	Polyacetal Tip Load 250±50 gf Silicone Rubber Load 300±100 gf Each One Million times
Writing Friction Life	Polyacetal Tip Load 250±50 gf 60mm/sec 20mm 100,000 times

Test condition : T/P is placed horizontally in a vessel and no power is supplied to T/P.  
Normal state is temperature : 25±10°C, relative humidity : 60±25%

REV/DATE	R0/ 11.10.99'					APP	CHK	BY
----------	------------------	--	--	--	--	-----	-----	----

3.2 ELECTRICAL CHARACTERISTICS OF BACKLIGHT

Used lamp : Rating

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
Lamp Voltage	V <sub>L</sub>	—	450	—	Vrms	
Lamp current	I <sub>L</sub>	3	4	5	mArms	
Lamp power consumption	P <sub>L</sub>	—	1.8	—	W	
Lamp frequency	F <sub>L</sub>	35	40	45	kHz	
Starting voltage	V <sub>s</sub>	—	800	1500	Vrms	T <sub>a</sub> = 25°C
Color Degree	X	0.32	0.33	0.34	—	
	Y	0.30	0.31	0.32		
Lamp life time	L <sub>L</sub>	—	20000	—	hrs	

LCM : Rating

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
Surface Luminance	L	—	82.6	—	cd/m <sup>2</sup>	ALL ON(I <sub>L</sub> =4mA)
		—	2.6	—	cd/m <sup>2</sup>	ALL OFF(I <sub>L</sub> =4mA)

### 3.3 INVERTER : TDK TAD250

#### 3.3.1 GENERAL SPECIFICATIONS

3.3.1.1 OPERATION TEMPERATURE : 0°C~50°C

3.3.1.2 STORAGE TEMPERATURE : -20°C~80°C

3.3.1.3 DIMENSION : 95.0(L)mm x 19.5(W)mm x MAX 8.8(H)mm

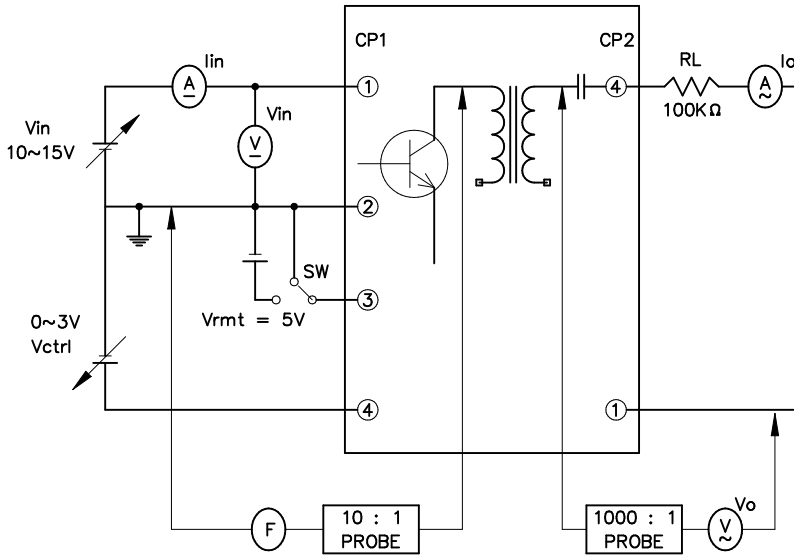
#### 3.3.2 INPUT CHARACTERISTICS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARKS
Input Voltage	Vin	10	12	15	V	
Input Current	Iin	-	450	550	mA	RL = 100KΩ, Vin = 12V
Input Power	Pin	-	5.4	6.6	W	RL = 100KΩ, Vin = 12V
Standby Standby Input Current	Iin Standby	-	0.1	1.0	μA	OFF state
Control Terminal Input Voltage	Vrmt	3.5	5	10	V	ON state
		-0.5	0	0.4	V	OFF state
Control Terminal Input Current	Irmt	-	0.5	1.0	mA	Vrmt = 5V
		-	-	-0.3	μA	Vrmt = 0V

#### 3.3.3 OUTPUT CHARACTERISTICS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARKS
NO Load Output Voltage	Vs	1400	-	-	Vrms	
Tube Current	IL	2.7	3	3.3	mA <sub>rms</sub>	Vctrl = 3V Min. Brightness
		5.4	6	6.6	mA <sub>rms</sub>	Vctrl = 0V Max. Brightness
Working Frequency	f	35	45	55	kHz	

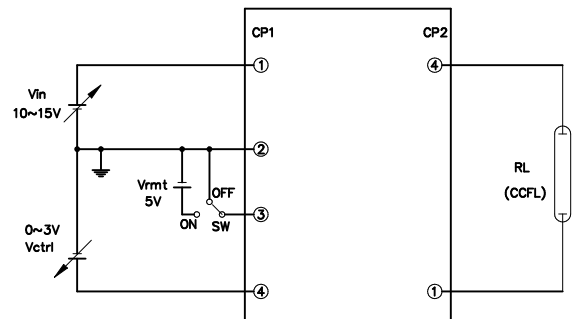
3.3.4 MEASUREMENT



3.3.5 MEASURE INSTRUMENTS

- (A) DIGITAL MULTIMETER  
HP 3478A or equivalent
- (V) DIGITAL MULTIMETER  
HP 3478A or equivalent
- (A) TRUE RMS MULTIMETER  
FLUKE 8060A or equivalent
- (V) TRUE RMS VOLTMETER  
HP 3400A or equivalent
- (F) TRUE RMS MULTIMETER  
FLUKE 8060A or equivalent

3.3.6 APPLICATION EXAMPLES



3.3.7 PIN ASSIGNMENTS

INPUT (CP1) CONNECTOR :  
MOLEX 53261-0590

NO.	SIGNAL
1	Vin
2	Gnd
3	Vrms
4	Vctrl
5	NC

OUTPUT (CP2) CONNECTOR :  
MITSUMI : M60-04-30-134P

NO.	SIGNAL
1	RTN
2	NC
3	NC
4	HV

## 4. OPTICAL CHARACTERISTICS

### 4-1. Optical Char. of Normal Temp. Mode

AT V<sub>OP</sub>

ITEM  MODE		Cr(Contrast Ratio)						$\theta$ (Viewing Angle)		$\phi$ (Viewing Angle)	
		0℃		25℃		50℃		25℃		25℃	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
T	M	-	25	-	35	-	20	-	±30	-	±42
note		NOTE6						NOTE5			

AT  $\phi=0^\circ$   $\theta=0^\circ$

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	0℃	-	800	-	ms	NOTE 2
		25℃	-	260	-		
		50℃	-	130	-		
Response Time (fall)	Tf	0℃	-	450	-	ms	NOTE 2
		25℃	-	120	-		
		50℃	-	80	-		

note:

T : TRANSMISSIVE  
M : NORMALLY BLACK(COLOR)

4-2. Color of CIE Coordinate

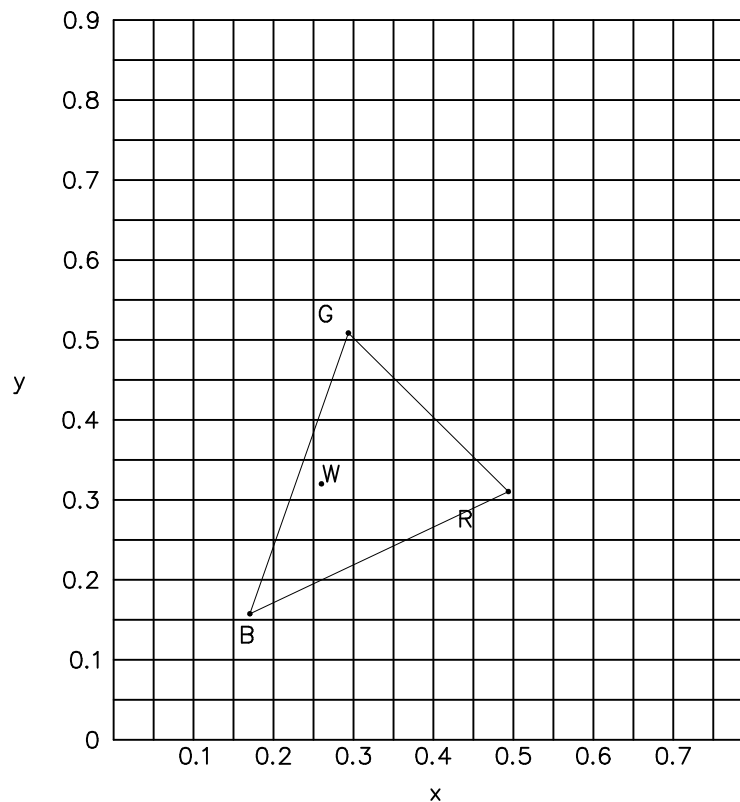
Ta = 25°C

ITEM		SYMBOL	CONDITION	VALUE	NOTE
Color of CIE Coordinate	Red	X	$\phi=0^\circ, \theta=0^\circ$ CCFL BACKLIGHT COLOR DEGREE X=0.33 Y=0.31	0.4850	Note*
		y		0.3234	
	Green	X		0.2924	
		y		0.5113	
	Blue	X		0.1734	
		y		0.1552	
	White	X		0.2635	
		y		0.3119	

Note\* Measuring at position 3 on Fig.1  
CIE chromaticity diagram

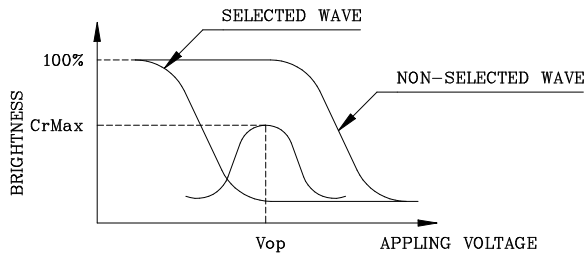
Tolerance :  $\pm 0.05$

Fig.1

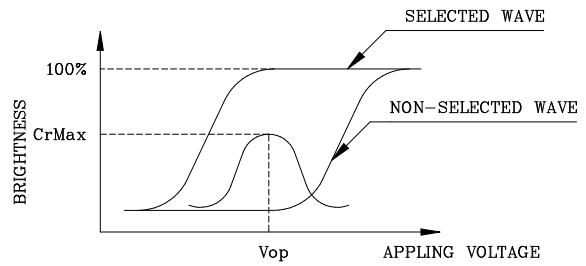


(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



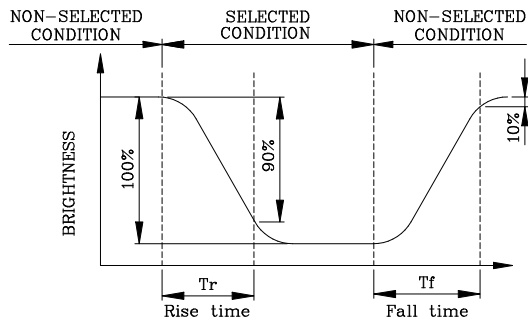
(negative type)

\*Conditions

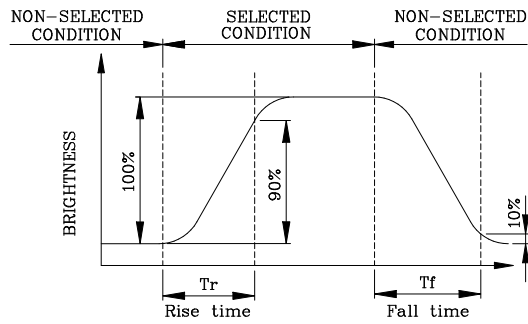
Viewing Angle : 0  
 Frame Frequency : 70Hz  
 Applying Waveform : 1/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



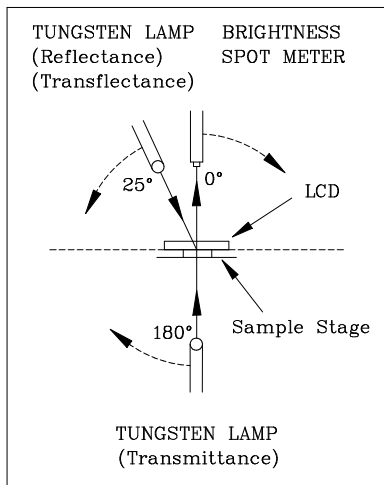
(negative type)

\*Conditions

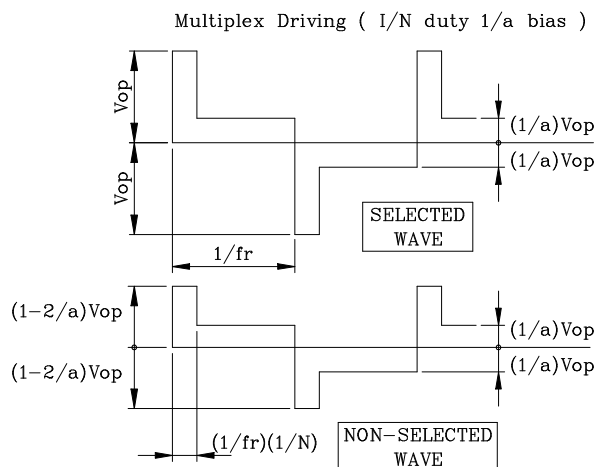
Operating Voltage : Vop  
 Viewing Angle (θ,φ) : (0,0)  
 Frame Frequency : 70Hz  
 Applying Waveform : 1/N duty 1/a bias

(NOTE 3)

Description of Measuring Equipment and Driving Waveforms

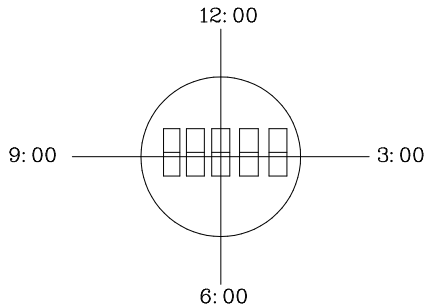


CONST.  
 TEMP.  
 CHAMBER



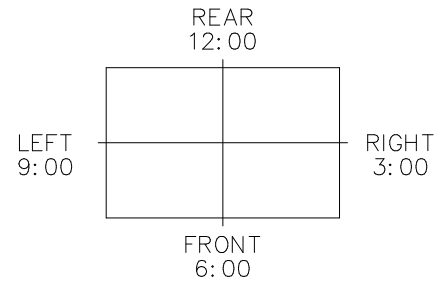
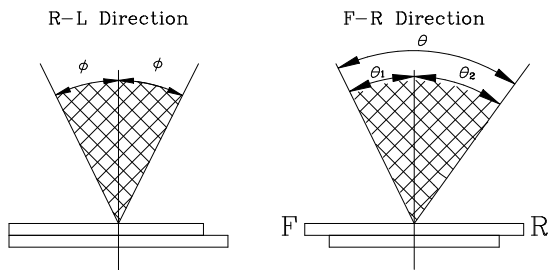
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



\*For This Product  
 The Viewing Direction Is 6 O'clock  
 So  $\theta_1 > \theta_2$

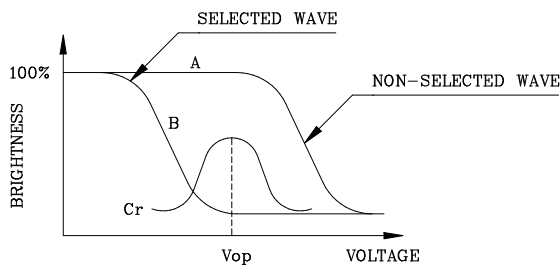
$$\theta = \theta_1 + \theta_2$$

\*Conditions

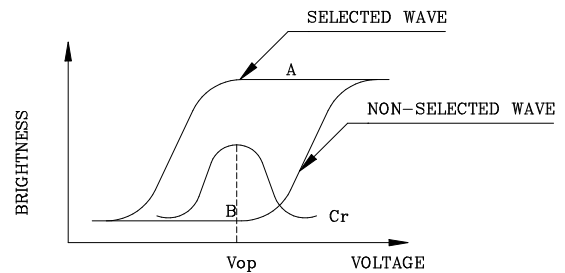
Operating Voltage :  $V_{op}$   
 Frame Frequency : 70Hz  
 Applying Waveform : 1/N duty 1/a bias  
 Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



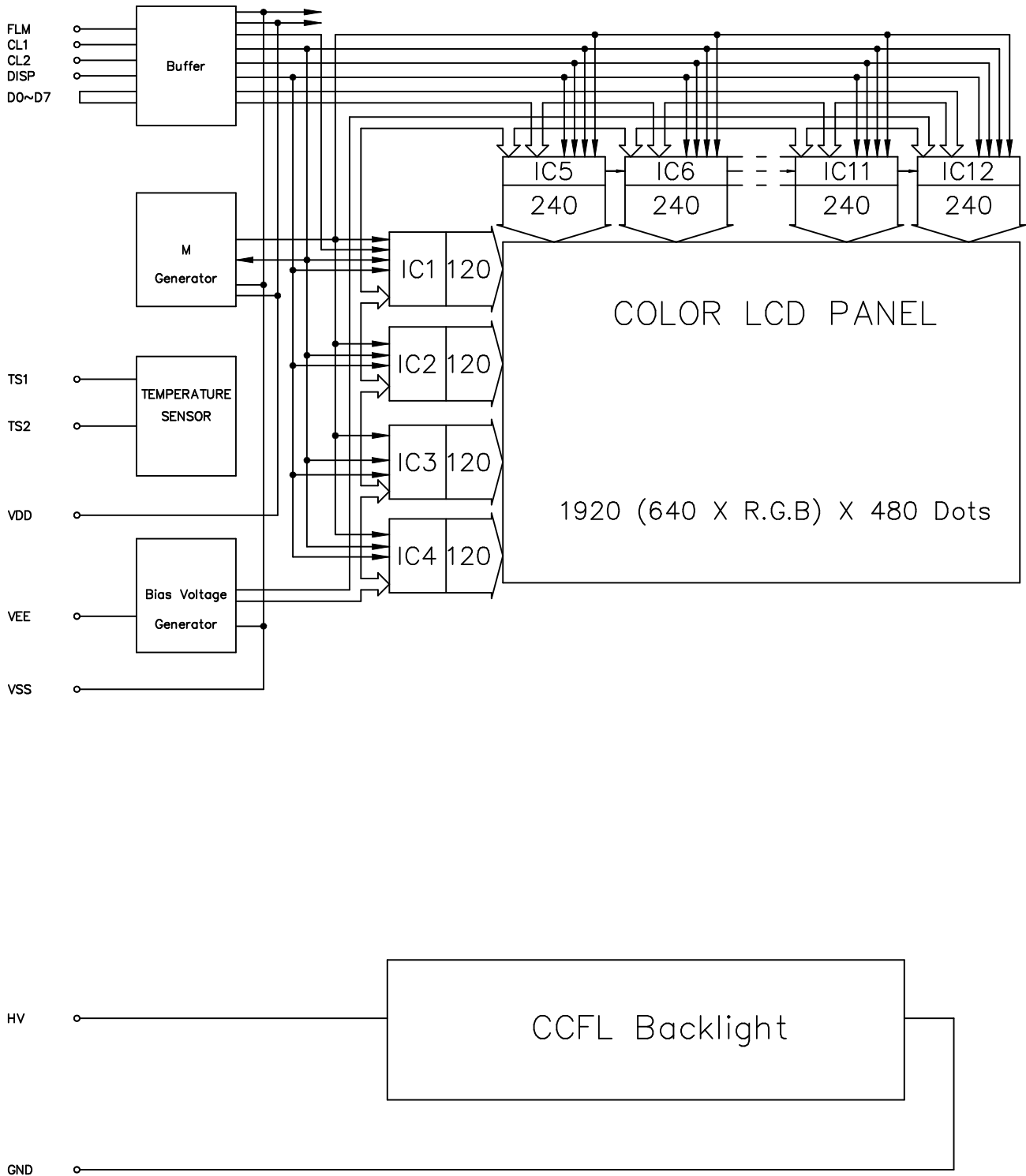
(negative type)

$$\text{Contrast Ratio : } Cr = A/B$$

\*Conditions

Viewing Angle : 0  
 Frame Frequency : 70Hz  
 Applying Waveform : 1/N duty 1/a bias

# 5. BLOCK DIAGRAM



## 6. INTERFACE PIN CONNECTION

FFC: PITCH 1.0mm / Suitable Connector : IL-402-22S-S1L-SA(JAE)

INTERFACE	PIN NO.	SYMBOL	FUNCTION
LCM	FFC	1	FLM Scan start-up signal
		2	VSS GND
		3	CL1 Input data latch signal
		4	VSS GND
		5	CL2 Data input clock
		6	VSS GND
		7	D0 Display data
		8	D1 Display data
		9	D2 Display data
		10	D3 Display data
		11	D4 Display data
		12	D5 Display data
		13	D6 Display data
		14	D7 Display data
		15	DISP Display control signal H: ON , L: OFF
		16	VDD Power supply voltage for logic
		17	VDD Power supply voltage for logic
		18	VSS GND
		19	VEE Power supply voltage for LCD(+)
		20	VSS GND
		21	TS1 Temperature sensor pin1
		22	TS2 Temperature sensor pin2

FLCN: MITSUMI/M63M83-04

(Suitable Connector: MITSUMI/M60-04-30-134P or M60-04-30-114P or M61M73-04)

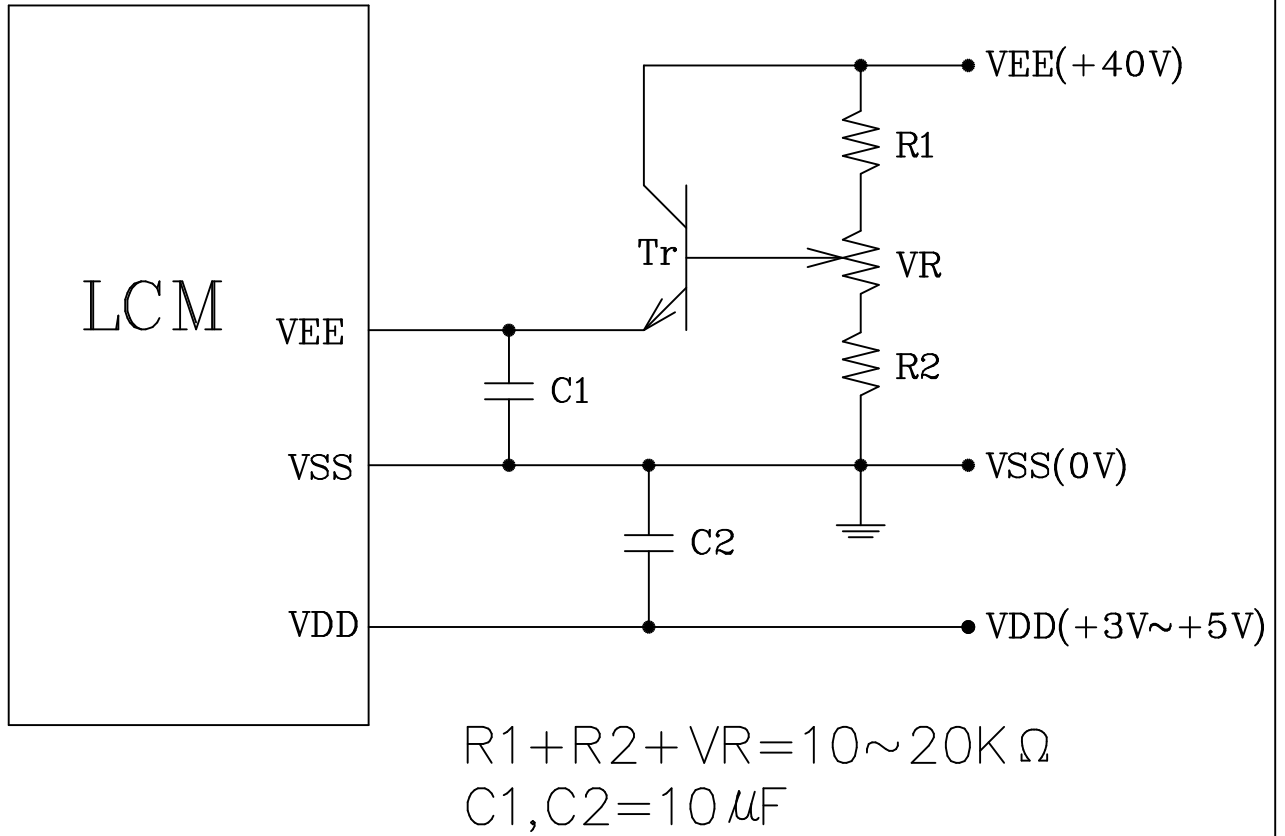
INTERFACE	PIN NO.	SYMBOL	FUNCTION
FLCN	1	GND	CFL GND
	2	N.C	-
	3	N.C	-
	4	HV	Power supply voltage for CFL

### TOUCH PANEL PIN CONNECTION

INTERFACE	PIN NO.	FUNCTION
FPC	1	RIGHT
	2	BOTTOM
	3	LEFT
	4	TOP

REV/DATE	R0/ 11.10.99'					APP	CHK	BY
----------	------------------	--	--	--	--	-----	-----	----

## 7. POWER SUPPLY

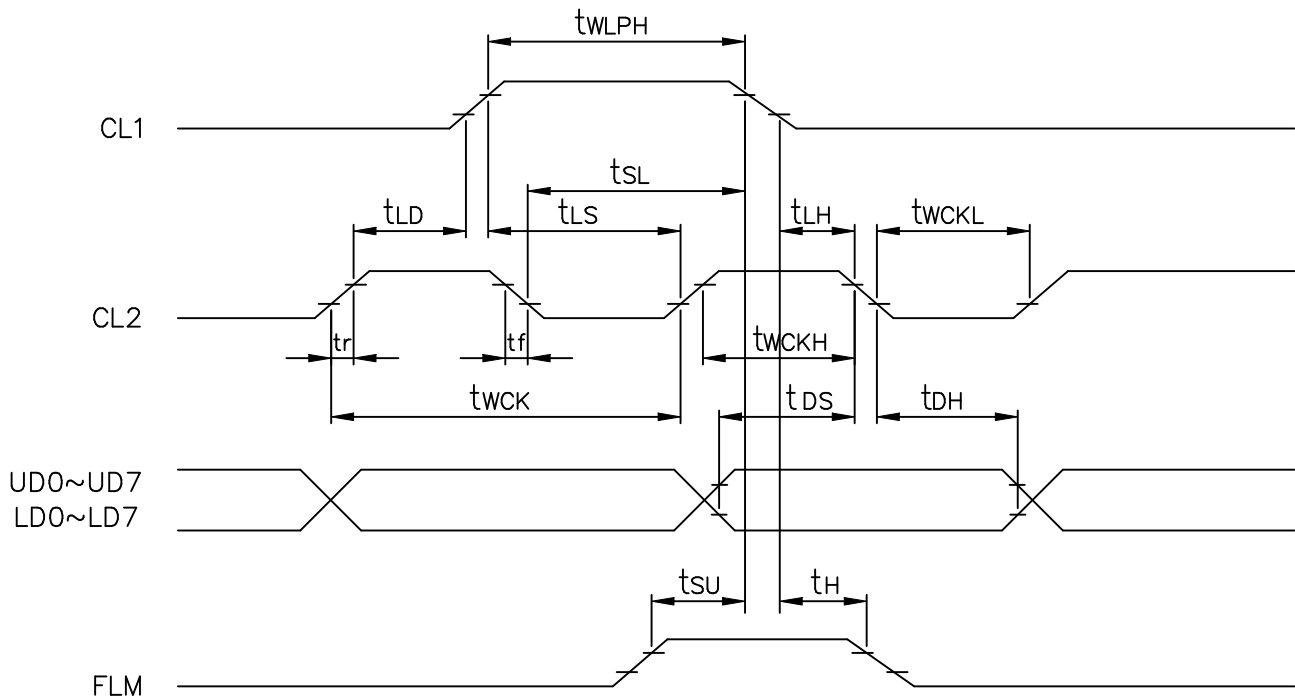


# 8. TIMING CHARACTERISTICS

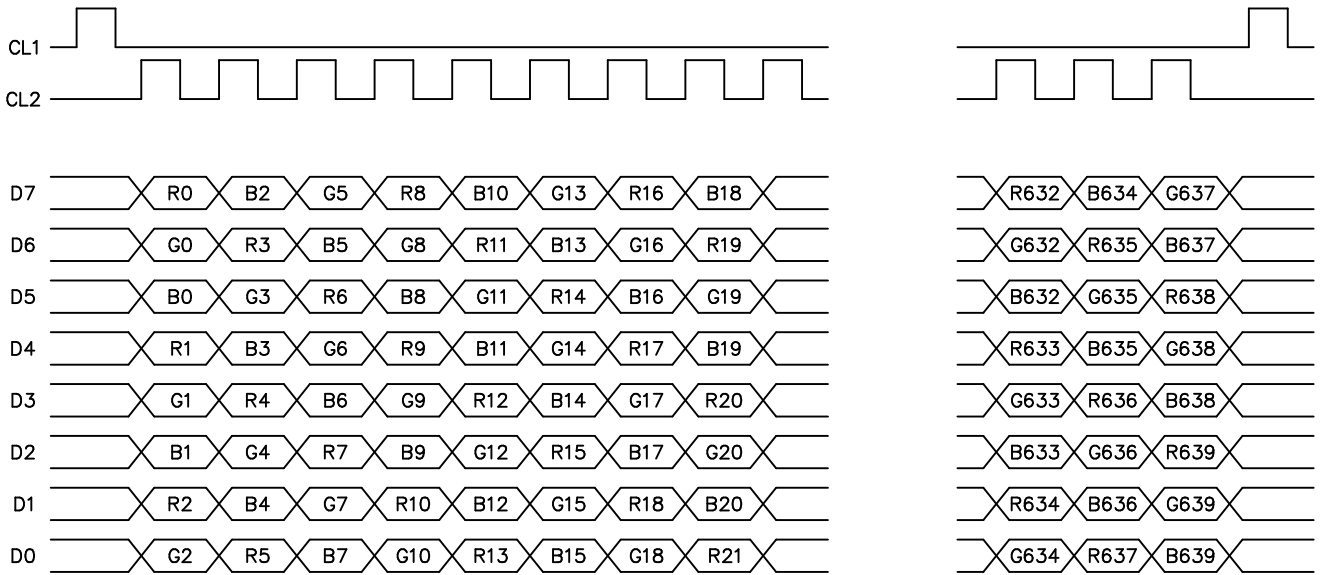
## 8-1. INTERFACE TIMING

VDD=3V~4.5V

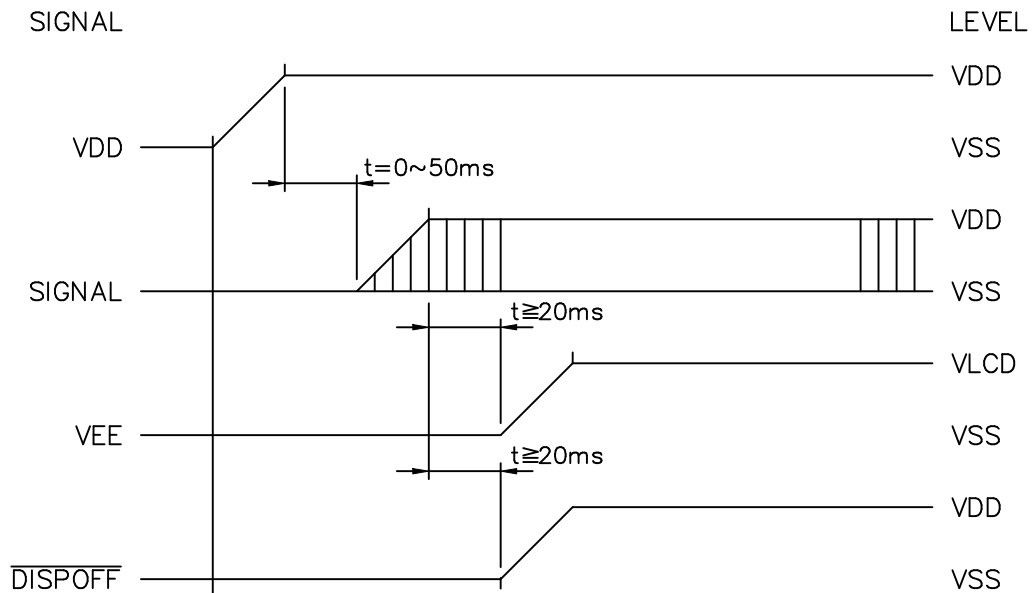
Parameter	SYMBOL	MIN.	MAX.	UNIT
CLOCK PULSE CYCLE TIME	$t_{wck}$	66	—	ns
CLOCK PULSE HIGH LEVEL WIDTH	$t_{wckH}$	23	—	ns
CLOCK PULSE LOW LEVEL WIDTH	$t_{wckL}$	23	—	ns
LATCH PULSE HIGH LEVEL WIDTH	$t_{wLPH}$	30	—	ns
CP→LP RISE TIME	$t_{LD}$	10	—	ns
CP→LP FALL TIME	$t_{SL}$	30	—	ns
LP→CP RISE TIME	$t_{LS}$	30	—	ns
LP→CP FALL TIME	$t_{LH}$	30	—	ns
CLOCK PULSE RISE/FALL TIME	$t_r, t_f$	—	50	ns
DATA SETUP TIME	$t_{DS}$	10	—	ns
DATA HOLD TIME	$t_{DH}$	25	—	ns
FLM SETUP TIME	$t_{SU}$	30	—	ns
FLM HOLD TIME	$t_H$	50	—	ns



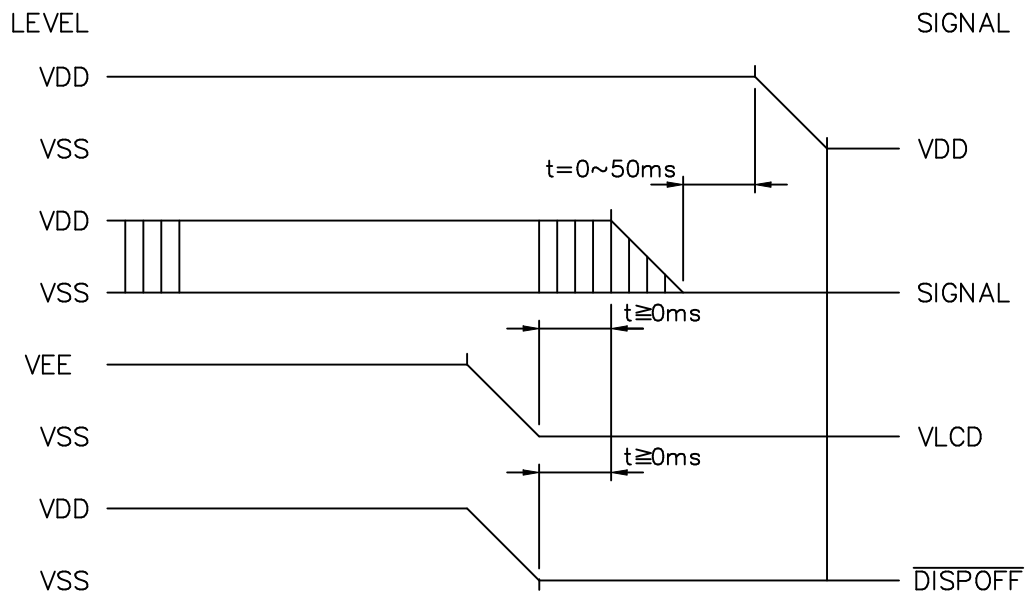
### 8-2. TIMING CHART



### 8-3. POWER ON/OFF TIMING ON SEQUENCE



### OFF SEQUENCE



Please maintain the above sequence when turning on and off the power supply of the module. If  $\overline{\text{DISPOFF}}$  is supplied to the module while internal alternate signal for LCD driving(M) is unstable, DC component will be supplied to the LCD panel. This may cause damage the LCD module.

# 9. DISPLAY

	1	2	3	4	5	6	7	8	
1	R0 D7	G0 D6	B0 D5	R1 D4	G1 D3	B1 D2	R2 D1	G2 D0	
2	R0 D7	G0 D6	B0 D5	R1 D4	G1 D3	B1 D2	R2 D1	G2 D0	

	1913	1914	1915	1916	1917	1918	1919	1920
	G637 D7	B637 D6	R638 D5	G638 D4	B638 D3	R639 D2	G639 D1	B639 D0
	G637 D7	B637 D6	R638 D5	G638 D4	B638 D3	R639 D2	G639 D1	B639 D0

479	R0 D7	G0 D6	B0 D5	R1 D4	G1 D3	B1 D2	R2 D1	G2 D0	
480	R0 D7	G0 D6	B0 D5	R1 D4	G1 D3	B1 D2	R2 D1	G2 D0	

	G637 D7	B637 D6	R638 D5	G638 D4	B638 D3	R639 D2	G639 D1	B639 D0
	G637 D7	B637 D6	R638 D5	G638 D4	B638 D3	R639 D2	G639 D1	B639 D0

# 10. RELIABILITY TEST

NO	ITEM	CONDITION			STANDARD	NOTE
1	High Temp. Storage	70°C 30%RH	120HR		Appearance without defect	
2	Low Temp. Storage	-20°C	120HR		Appearance without defect	
3	High Temp. & High Humi. Storage	40°C 90%RH	120HR		Appearance without defect	
4	Thermal Shock	-20°C, 30min → R.T. 5min → 60°C, 30min → R.T. 5min (1 cycle)			Appearance without defect	5 cycles

Inspection Provision

1. Purpose

The NAN YA inspection provision provides outgoing inspection provision and its expected quality level based on our outgoing inspection of NAN YA LCD produces.

2. Applicable Scope

The NAN YA inspection provision is applicable to the arrangement in regard to outgoing inspection and quality assurance after outgoing.

3. Technical Terms

3-1 NAN YA Technical Terms



4. Outgoing Inspection Provision

Outgoing inspection is according to the product inspection manual.

4-1 Inspection Method

MIL-STD-105D Level II Regular inspection

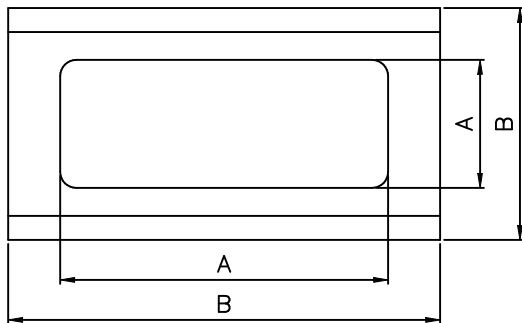
4-2 Inspection Standard

	Item		AQL(%)	Remarks
Major Defect	Dots	Opens Shorts Erroneous operation	0.4	faults which substantially lower the practicality and the initial purpose difficult to achieve.
	Solder appearance	Shorts Loose		
	Cracks	Display surface cracks		
	Tablet contact resistance			
	Tablet input load			

		Tablet lineality		0.4	
		Dimensions	External from Dimensions	0.4	
Minor Defect	Inside the glass	Black spots		0.65	faults which appear to pose almost no obstacle to the practicality, effective use, and operation.
	Polarizing plate	Scratches, foreign Matter, air bubbles, and peeling			
	Dots	Pinhole, deformation			
	Color tone	Color unevenness			
	Solder appearance	Cold solder Solder projections			

4-3 Inspection Provisions  
\*Viewing Area Definition

Fig. 1



A : Zone Viewing Area  
B : Zone Glass Plate Out Line

\*Inspection place to be 500 to 1000 lux illuminance uniformly without glaring.  
The distance between luminous source(daylight fluorescent lamp and cool white fluorescent lamp) and a sample to be 30cm to 50cm.

\*Test and measurement are performed under the following conditions, unless otherwise specified.

Otherwise specified.

Temperature 20± 15°C  
 Humidity 65± 20%R.H..  
 Pressure 860~1060hPa(mbar)

In case of doubtful judgment, it is performed under the following conditions.

Temperature 20± 15°C  
 Humidity 65± 20%R.H..  
 Pressure 860~1060hPa(mbar)

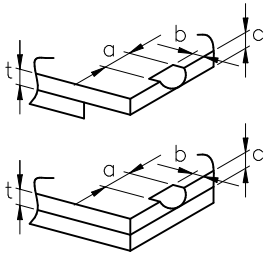
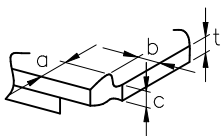
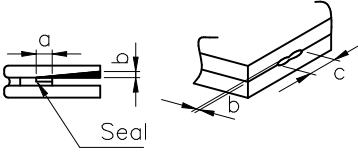
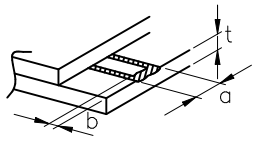
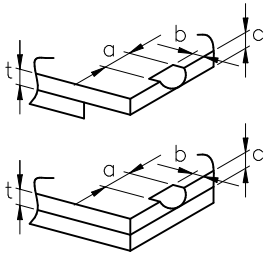
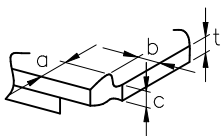
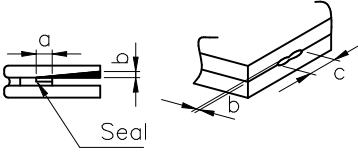
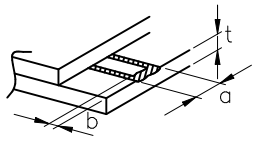
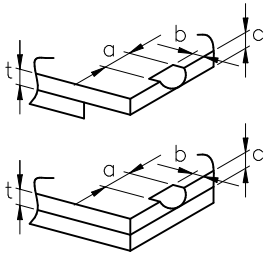
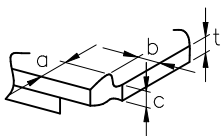
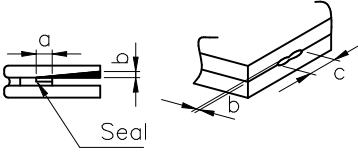
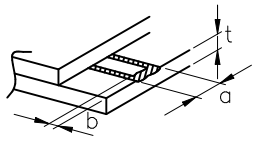
5.Specification for quality check  
 5-1 Electrical characteristics

NO.	Item	Criterion
1.	Non operational	NO-GO
2.	Miss operating	NO-GO
3.	Missing dot	NO-GO
4.	Contrast irregular	Non detectable
5.	Response time	Within Specified value
6.	Tablet contact resistance	NO-GO
7.	Tablet input load	NO-GO
8.	Tablet lineality	NO-GO
9.	EL backlight turn on/off	NO-GO

5-2 External Appearance Defect

NO.	Item	Criterion																							
1.	Black spots, foreign matter, and white spots (Including light leakage due to pinholes of polarizing plates, etc.)	<p>(1)-1-Spots(At non lighting condition)</p> <table border="1" data-bbox="705 488 1385 770"> <thead> <tr> <th>Average Diameter(mm):D</th> <th>Number of pieces permitted</th> <th>Minimum Space</th> </tr> </thead> <tbody> <tr> <td><math>D \leq 0.2</math></td> <td>Ignore</td> <td>-</td> </tr> <tr> <td><math>0.2 &lt; D \leq 0.3</math></td> <td>7</td> <td>10mm</td> </tr> <tr> <td><math>0.3 &lt; D \leq 0.4</math></td> <td>3</td> <td>30mm</td> </tr> <tr> <td><math>0.4 &lt; D</math></td> <td>0</td> <td></td> </tr> </tbody> </table> <p>Number of total pieces is set to within 7 pieces.</p> <p>Note that when there are 2 pieces or more, they are not to be concentrated. Set as: Average diameter = (Long diameter + Short diameter)/2</p> <p>(1)-2-Spots(At lighting condition)</p> <table border="1" data-bbox="705 1182 1334 1420"> <thead> <tr> <th>Average Diameter(mm):D</th> <th>Number of pieces permitted</th> </tr> </thead> <tbody> <tr> <td><math>D \leq 0.3</math></td> <td>Ignore</td> </tr> <tr> <td><math>0.3 &lt; D \leq 0.75</math></td> <td>5</td> </tr> <tr> <td><math>0.75 &lt; D</math></td> <td>0</td> </tr> </tbody> </table> <p>Number of total pieces is set to within 5 pieces.</p> <p>Note that when there are 2 pieces or more, they are not to be concentrated. Set as: Average diameter = (Long diameter + Short diameter)/2</p>	Average Diameter(mm):D	Number of pieces permitted	Minimum Space	$D \leq 0.2$	Ignore	-	$0.2 < D \leq 0.3$	7	10mm	$0.3 < D \leq 0.4$	3	30mm	$0.4 < D$	0		Average Diameter(mm):D	Number of pieces permitted	$D \leq 0.3$	Ignore	$0.3 < D \leq 0.75$	5	$0.75 < D$	0
Average Diameter(mm):D	Number of pieces permitted	Minimum Space																							
$D \leq 0.2$	Ignore	-																							
$0.2 < D \leq 0.3$	7	10mm																							
$0.3 < D \leq 0.4$	3	30mm																							
$0.4 < D$	0																								
Average Diameter(mm):D	Number of pieces permitted																								
$D \leq 0.3$	Ignore																								
$0.3 < D \leq 0.75$	5																								
$0.75 < D$	0																								

1.	Black spots, foreign matter, and white spots (Including light leakage due to pinholes of polarizing plates, etc.)	<p>(1)-1 Spots(At non lighting condition)</p> <table border="1" data-bbox="710 425 1452 712"> <thead> <tr> <th>Width(mm): W</th> <th>Length(mm): L</th> <th>Number of pieces permitted</th> </tr> </thead> <tbody> <tr> <td><math>W \leq 0.03</math></td> <td>Ignore</td> <td>Ignore</td> </tr> <tr> <td><math>0.03 &lt; W \leq 0.08</math></td> <td><math>L \leq 4</math></td> <td>2</td> </tr> <tr> <td><math>0.08 &lt; W \leq 0.1</math></td> <td><math>L \leq 1</math></td> <td>1</td> </tr> </tbody> </table> <p>Object exceeding 0.1mm follow the standards of the spots form. Note that when there are 2 pieces or more, they are not to be concentrated.</p> <p>(1)-2 Spots(At lighting condition)</p> <table border="1" data-bbox="710 1019 1452 1305"> <thead> <tr> <th>Width(mm): W</th> <th>Length(mm): L</th> <th>Number of pieces permitted</th> </tr> </thead> <tbody> <tr> <td><math>W \leq 0.03</math></td> <td>Ignore</td> <td>Ignore</td> </tr> <tr> <td><math>0.03 &lt; W \leq 0.08</math></td> <td><math>L \leq 3</math></td> <td>6</td> </tr> <tr> <td><math>0.08 &lt; W</math></td> <td><math>3 &lt; L</math></td> <td>None</td> </tr> </tbody> </table> <p>Object exceeding 0.1mm follow the standards of the spots form. Note that when there are 2 pieces or more, they are not to be concentrated.</p>	Width(mm): W	Length(mm): L	Number of pieces permitted	$W \leq 0.03$	Ignore	Ignore	$0.03 < W \leq 0.08$	$L \leq 4$	2	$0.08 < W \leq 0.1$	$L \leq 1$	1	Width(mm): W	Length(mm): L	Number of pieces permitted	$W \leq 0.03$	Ignore	Ignore	$0.03 < W \leq 0.08$	$L \leq 3$	6	$0.08 < W$	$3 < L$	None
Width(mm): W	Length(mm): L	Number of pieces permitted																								
$W \leq 0.03$	Ignore	Ignore																								
$0.03 < W \leq 0.08$	$L \leq 4$	2																								
$0.08 < W \leq 0.1$	$L \leq 1$	1																								
Width(mm): W	Length(mm): L	Number of pieces permitted																								
$W \leq 0.03$	Ignore	Ignore																								
$0.03 < W \leq 0.08$	$L \leq 3$	6																								
$0.08 < W$	$3 < L$	None																								
2.	Scratches(Glass, reflection plates, and polarizing plates)	In accordance with black spots. (At non lighting condition)																								
3.	Color irregular	Not remarkable color irregular.																								

<p>4. Air bubbles polarizing plates, and reflection plates</p>	<table border="1" data-bbox="710 376 1225 667"> <tr> <th data-bbox="710 376 970 521">Average Diameter (mm): D</th> <th data-bbox="970 376 1225 521">Number of pieces permitted</th> <th data-bbox="1225 376 1476 667" rowspan="2">Average diameter = (Long diameter + Short diameter)/2</th> </tr> <tr> <td data-bbox="710 521 970 667">D ≤ 0.3 0.3 &lt; D</td> <td data-bbox="970 521 1225 667">Ignore 0</td> </tr> </table> <p data-bbox="710 683 1476 779">Note that when there are 4 pieces or more, they are not to be concentrated.</p>		Average Diameter (mm): D	Number of pieces permitted	Average diameter = (Long diameter + Short diameter)/2	D ≤ 0.3 0.3 < D	Ignore 0					
Average Diameter (mm): D	Number of pieces permitted	Average diameter = (Long diameter + Short diameter)/2										
D ≤ 0.3 0.3 < D	Ignore 0											
<p>5. Cracks</p>	<table border="1" data-bbox="662 779 1476 1964"> <tr> <td data-bbox="662 779 1066 1169"> <p>(1) General crack</p>  </td> <td data-bbox="1066 779 1476 1169"> <p>a ≤ 5 b ≤ 2 c ≤ t</p> <p>Where, a and b are ignored when less than or equal 0.5. The numbers of pieces are set at up to 5 pieces.</p> </td> </tr> <tr> <td data-bbox="662 1169 1066 1361"> <p>(2) Corner crack</p>  </td> <td data-bbox="1066 1169 1476 1361"> <p>a ≤ 2.5 b ≤ 2.5 c ≤ t a + b ≤ 4</p> </td> </tr> <tr> <td data-bbox="662 1361 1066 1630"> <p>(3) Seal portion crack</p>  </td> <td data-bbox="1066 1361 1476 1630"> <p>a ≤ The seal width × 1/3 b ≤ t × 2/3 c ≤ 5</p> <p>The numbers of pieces are set at up to 5 pieces.</p> </td> </tr> <tr> <td data-bbox="662 1630 1066 1870"> <p>(4) ITO Pin crack</p>  </td> <td data-bbox="1066 1630 1476 1870"> <p>a ≤ 5 b ≤ 1/3 pin length c ≤ t</p> </td> </tr> <tr> <td data-bbox="662 1870 1066 1964"> <p>(5) Progressive cracks</p> </td> <td data-bbox="1066 1870 1476 1964"> <p>All taken to be unacceptable.</p> </td> </tr> </table>		<p>(1) General crack</p> 	<p>a ≤ 5 b ≤ 2 c ≤ t</p> <p>Where, a and b are ignored when less than or equal 0.5. The numbers of pieces are set at up to 5 pieces.</p>	<p>(2) Corner crack</p> 	<p>a ≤ 2.5 b ≤ 2.5 c ≤ t a + b ≤ 4</p>	<p>(3) Seal portion crack</p> 	<p>a ≤ The seal width × 1/3 b ≤ t × 2/3 c ≤ 5</p> <p>The numbers of pieces are set at up to 5 pieces.</p>	<p>(4) ITO Pin crack</p> 	<p>a ≤ 5 b ≤ 1/3 pin length c ≤ t</p>	<p>(5) Progressive cracks</p>	<p>All taken to be unacceptable.</p>
<p>(1) General crack</p> 	<p>a ≤ 5 b ≤ 2 c ≤ t</p> <p>Where, a and b are ignored when less than or equal 0.5. The numbers of pieces are set at up to 5 pieces.</p>											
<p>(2) Corner crack</p> 	<p>a ≤ 2.5 b ≤ 2.5 c ≤ t a + b ≤ 4</p>											
<p>(3) Seal portion crack</p> 	<p>a ≤ The seal width × 1/3 b ≤ t × 2/3 c ≤ 5</p> <p>The numbers of pieces are set at up to 5 pieces.</p>											
<p>(4) ITO Pin crack</p> 	<p>a ≤ 5 b ≤ 1/3 pin length c ≤ t</p>											
<p>(5) Progressive cracks</p>	<p>All taken to be unacceptable.</p>											

NAN YA PLASTICS CORP.  
ELEC. MATERIALS DIV.  
LCD DEPARTMENT

## SPECIFICATION

SPEC. NO. : LM302-0  
DATE : NOV. 10, 1999  
SHEET NO. : 26/29

6.	Outer dimensions	Should be with in the tolerance.
7.	Newton ring	Orbicular of interference fringes. To be non. In case of doubtful judgenemt, agreement shall be reachment.
8.	Soldering	Should be no defective soldering such as shorting, loose terminal cold solder, peeling of printed circuit board pattern, improper mouting position, etc.

REV/DATE

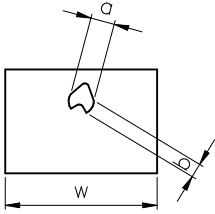
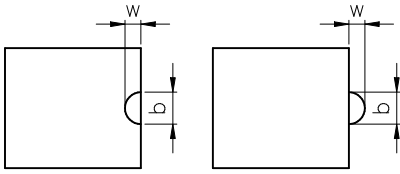
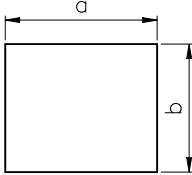
R0/  
11.10.99'

APP

CHK

BY

5-3 Dot Appearance Defect

NO.	Item	Criteria
1.	Pinhole	 <p>Dot display a and b are each <math>\leq 0.2\text{mm}</math>                      The overall total is taken be with in 10 units.                      Note that they are not to be concentrated.</p>
2.	Missing	 <p>Dot display a and b are each <math>\leq 0.2\text{mm}</math>                      The overall total is taken to be with in 10 units.</p>
3.	Thick and thin display	 <p>Taken to be within <math>\pm 1.5\%</math> of display character width(a) and height(b).</p>

(2) NOTE:

• SAFETY

- 1.If the LCD panel breaks, be careful not to get the liquid crystal to touch your skin.
- 2.If the liquid crystal touches your skin or clothes, please wash it off immediately by using soap and water.

• HANDLING

- 1.Avoid static electricity which can damage the CMOS LSI.
- 2.Do not remove the panel or frame from the module.
- 3.The polarizing plate of the display is very fragile. So, please handle it very carefully.
- 4.Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
- 5.Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.

• STORAGE

- 1.Store the panel or module in a dark place where the temperature is  $25^{\circ}\text{C}\pm 5^{\circ}\text{C}$  and the humidity is below 65% RH.
- 2.Do not place the module near organics solvents or corrosive gases.
- 3.Do not crush, shake, or jolt the module.

• TERMS OF WARRANT

- 1.Acceptance inspection period  
The period is within one month after the arrival of contracted commodity at the buyer's factory site.
- 2.Applicable warrant period  
The period is within twelve months since the date of shipping out under normal using and storage conditions.

• THE OPERATING LIFE TIME OF BACK LIGHT

CCFT : 20,000HR

