INTELTRONIC

5.7 inch TFT LCD
With Touch Panel
SPECIFICATION

MODEL NAME: LMTDA057BQN1-4R21

Date: 2012 / 04 / 27

Customer signature		
Customer		
Approved Date	Approved By	Reviewed By

Table of Contents

2. RECORD OF REVISION

Rev	Date	Item	Page	Comment
1	20/OCT/09'			Initial Preliminary
2	13/OCT/09'	5.3 8.3	3 9	Add Drawing of LED array Modify: Color Data Input Assignment
A	25/Mar/10'	15,16	16,17	Change OUTLINE DRAWING from rev:1 to rev:2 Release Rev A for production.
B	14/DEC/10'	5.3 12	3 14	1.Modify LED dice Life Time from 25K hrs to 40K hrs 2.Revise LCM PRODUCT LABEL DEFINE
C	27/APR/12'	10	12	Modify TOUCH PANEL CHARACTERISTICS

3. APPLICATION

Digital equipments which need color display, such as P.O.S, medical equipments and industrial equipments.

4. GENERAL SPECIFICATIONS

Parameter	Specifications	Unit
Display resolution	(320X R.G.B) (W) x 240(H)	dot
Active area	115.2(W) x 86.4(H)	mm
Screen size	5.7(Diagonal)	inch
Dot pitch	0.12(W) x 0.36(H)	mm
Color configuration	R.G.B. Stripe	
Overall dimension	144 (W) x 104.6(H) x 14.8(D)	mm
Weight	242	g
Surface treatment	Anti-glare	
View Angle direction	12 o'clock	
Our components and processes are compliant to RoHS standard		

5. ELECTRICAL CHARACTERISTICS

5.1 Absolute Maximum Ratings   GND=0V

Parameter	Symbol	MIN.	MAX.	Unit	Remark
Power supply voltage	Vcc	-0.3	+7.0	V	
Logic input voltage	VI	-0.3	Vcc+0.3	V	
Operating temperature	Top	-20	70	°C	Ambient temperature
Storage temperature	Tst	-30	80	°C	Ambient temperature

5.2 TFT-LCD Driving Conditions   GND=0V ,Ta=25°C

Parameter	Symbol	MIN.	Typ.	MAX.	Unit	Remark
Power Supply voltage	V_{CC}	+3.0	+3.3	+3.6	V	
Power Supply Current	I_{CC}		130	150	mA	V_{CC} =3.3V
"H" level logical input voltage	V_{IH}	0.7Vcc	--	3.6	V	
"L" level logical input voltage	V_{IL}	0V	--	0.3Vcc	V	

5.3 Backlight Driving Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED current	I_L	--	140	--	mA	
VLED voltage	V_L	--	10.2	10.8	V	
LED dice Life Time		--	40000	--	hr	Note 1:

Note 1: The "LED dice life time" is defined as the LED dice brightness decrease to 50% original brightness that the ambient temperature is 22°C and LED dice current 20mA.

6. BLOCK DIAGRAM

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LED A ─────┐
           ├──────┐  Backlight Unit
LED K ─────┘       │
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┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
│   ┌───────────────────────────────────┐   │
│   │            TFT                     │   │
│   │          Display                   │   │
│   └───────────────────────────────────┘   │
│   ┌──────────┐       ┌────────────────┐   │
│   │          │       │ TFT-LCD PANEL  │   │
│   │  Scan    │──────>│ (320xR,G,Bx240)│   │
│   │  Driver  │       │     DOTS       │   │
│   │  IC      │       └────────────────┘   │
│   │          │              ▲             │
│   └──────────┘              │             │
│        ▲          ┌────────────────┐      │
│        │          │ Data Driver IC │      │
│        │          │ Timing Control │      │
│        └──────────┤                │      │
│                   └────────────────┘      │
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┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
│  HS  ──>┌──────────┐                  │
│  VS  ──>│          │                  │
│  CLK1──>│  INPUT   │──────────────────┼──>
│  DE  ──>│Connector │                  │
│  R0~R5─>│          │                  │
│  G0~G5─>│          │ ┌──────────────┐ │
│  B0~B5─>│          │ │ DC/DC        │ │
│  VCC ──>│          │─>│ Converter &  │ │
│  GND ──>│          │ │ Reference    │ │
│         │          │ │ Voltage Gen  │ │
│         │          │ │ TTL 571 Board│ │
│         └──────────┘ └──────────────┘ │
└ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
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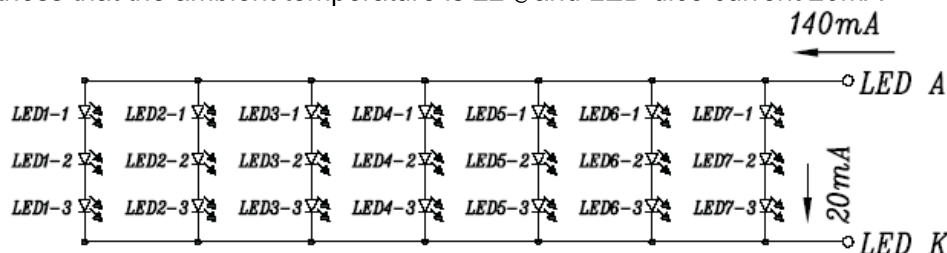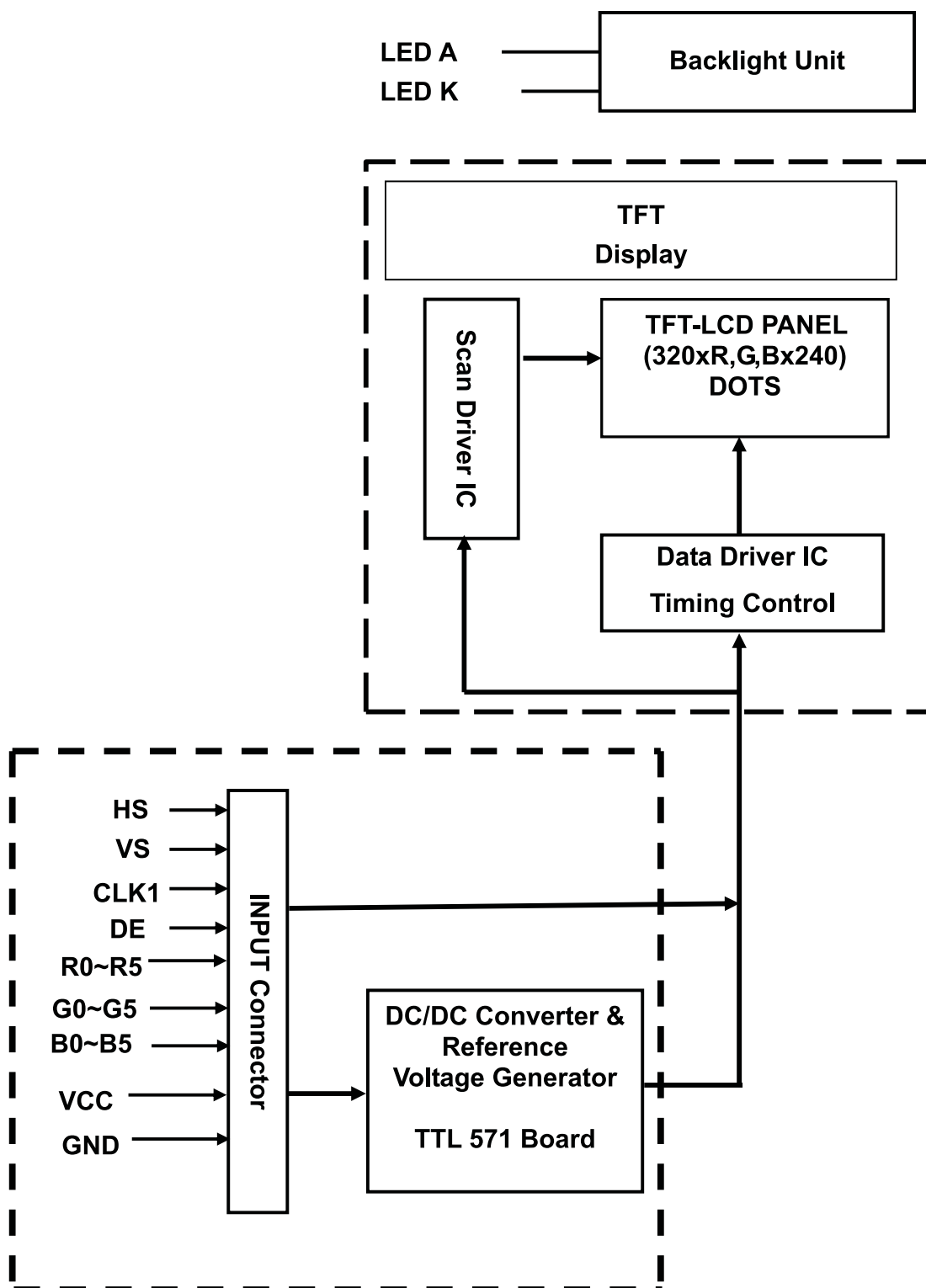
7. PIN CONNECTIONS
7.1 P1 Input Pins Connection (To TTL571 control board)

Pin No	Symbol	Function	Remark
1	GND	Ground for logic circuit	
2	CLK1	Data sampling clock	
3	HS (HSYNC)	Horizontal synchronous signal	
4	VS (VSYNC)	Vertical synchronous signal	
5	GND	Ground for logic circuit	
6	R0	Red pixel data(LSB)	
7	R1	Red pixel data	
8	R2	Red pixel data	
9	R3	Red pixel data	
10	R4	Red pixel data	
11	R5	Red pixel data(MSB)	
12	GND	Ground for logic circuit	
13	G0	Green pixel data(LSB)	
14	G1	Green pixel data	
15	G2	Green pixel data	
16	G3	Green pixel data	
17	G4	Green pixel data	
18	G5	Green pixel data(MSB)	
19	GND	Ground for logic circuit	
20	B0	Blue pixel data(LSB)	
21	B1	Blue pixel data	
22	B2	Blue pixel data	
23	B3	Blue pixel data	
24	B4	Blue pixel data	
25	B5	Blue pixel data(MSB)	
26	GND	Ground for logic circuit	
27	DE	Data Enable (connected to GND, if sync mode)	
28	Vcc	Power Supply : +3.3V	
29	Vcc	Power Supply : +3.3V	
30	R/L	Horizontal display mode select signal Left / Right Scan control input	*2
31	U/D	Vertical display mode select signal Up / Down Scan control input	*2
32	NC	No Connection	
33	GND	Ground for logic circuit	

*1 The horizontal display start timing is settled in accordance with a rising timing of DE signal.
  Don't keep DE "High" during operation.

R/L=L
U/D=H

R/L=H
U/D=H
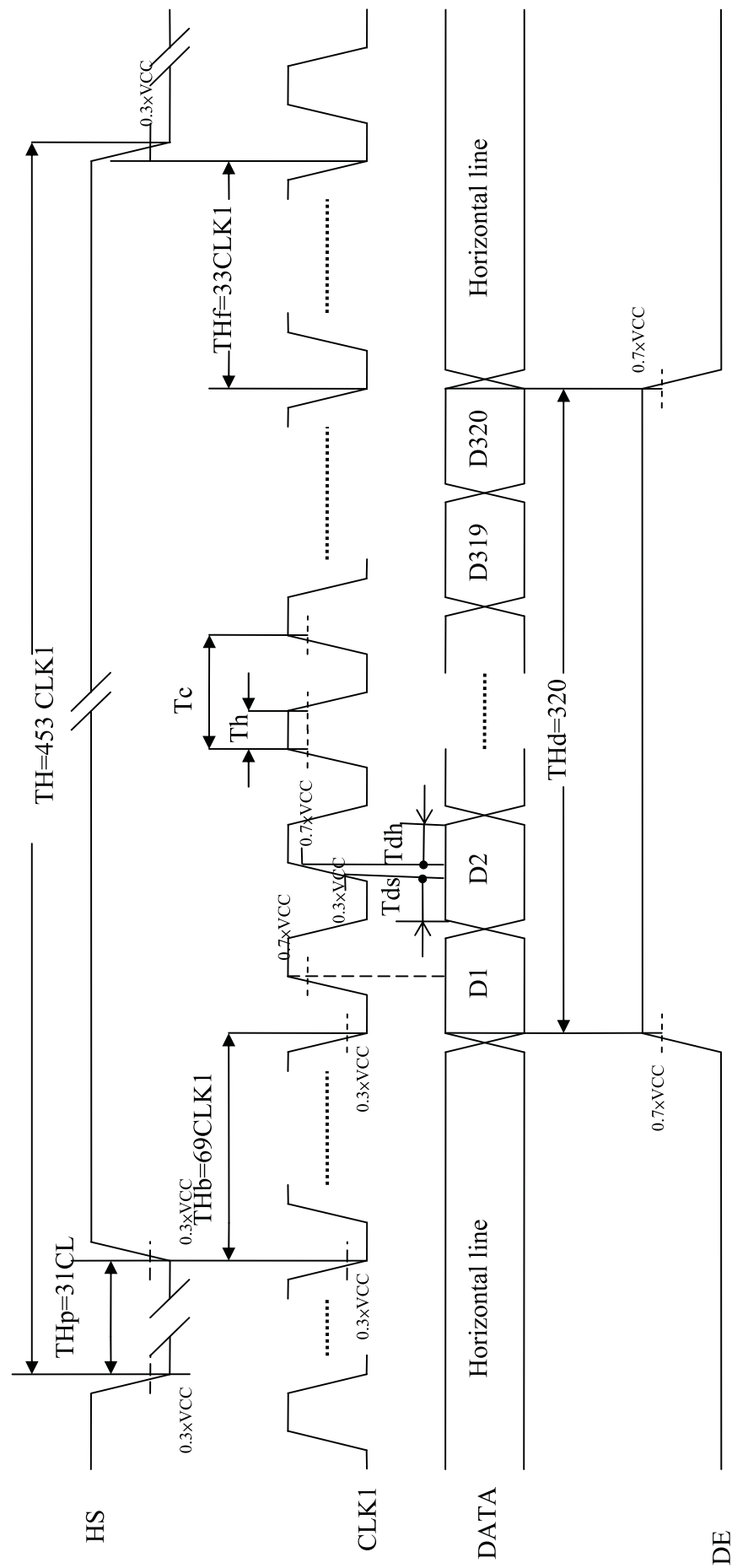
R/L=L
U/D=L

R/L=H
U/D=L
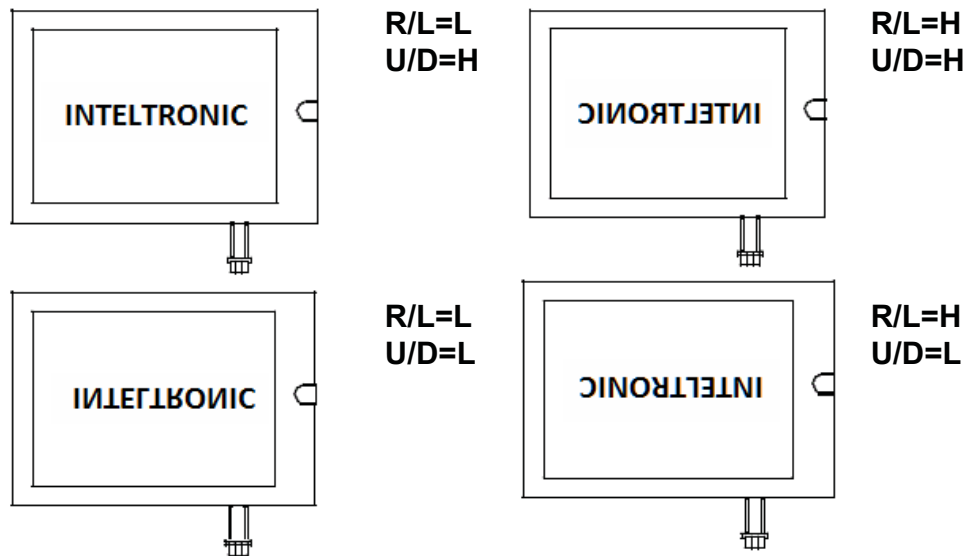
8. INTERFACE SPECIFICATIONS
8.1 Input Signal Timing Specifications

| Parameter		Symbol	MIN.	TYP.	MAX.	Unit	Remarks
CLK	Frequency	1/Tc		7.21		MHz	
	Duty ratio	Th/Tc	40	50	60	%	
DATA	Setup time	Tds	12			ns	
	Hold time	Tdh	12			ns	
Horizontal synchronizing	Period	TH	--	453	--	Clock	
	Pulse width	THp	--	31	--	Clock	
	Horizontal period	THd	--	320	--	Clock	
	Blank porch	THb	--	69	--	Clock	
	Front porch	THf	--	33	--	Clock	
Vertical synchronizing	Period	TV	--	267	--	Line	
	Pulse width	TVp	--	6	--	Line	
	Vertical period	TVd	--	240	--	Line	
	Blank porch	TVb	--	18	--	Line	
	Front porch	TVf	--	3	--	Line	

Note:
✧ In case of using the slow frequency, the deterioration of display flicker etc may occur.
✧ The timing characteristics are basically fixed as above.
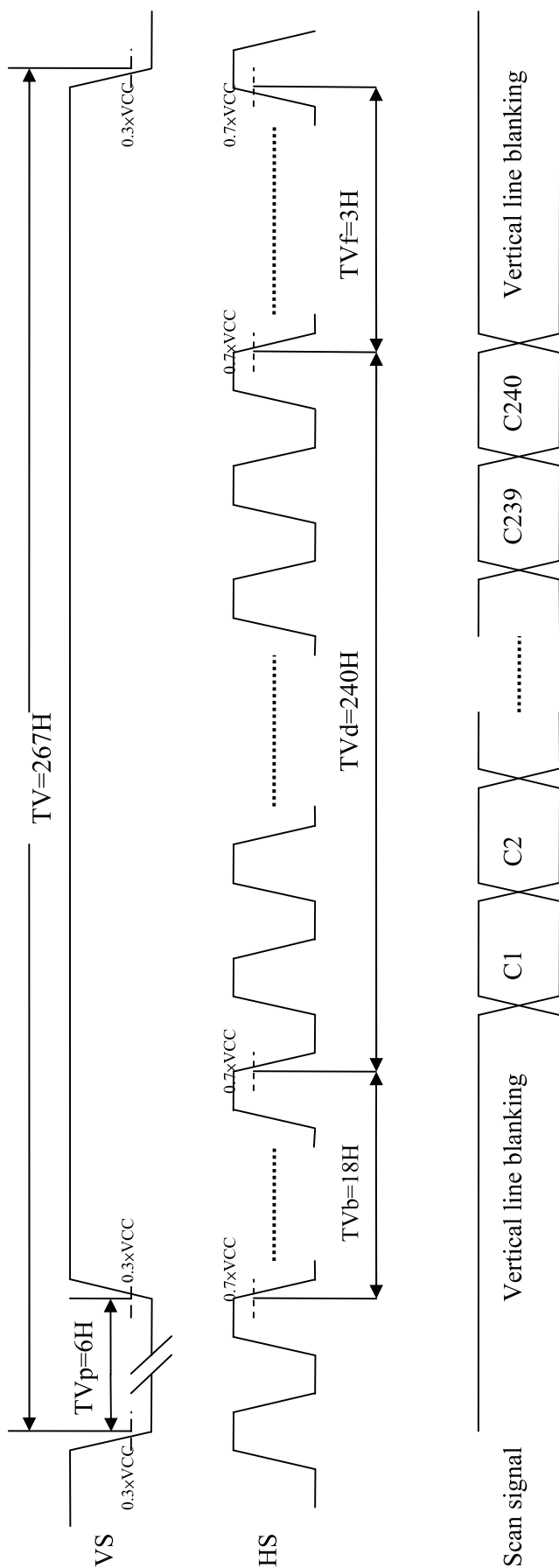
8.2 Power Off/On Sequence Timing

Timing Specifications:
$0<T1\leq15mS$
$T2>0.5S$
$0<T3\leq0.1S$
$T4>1S$
$T5>0.1S$
$T6>0.1S$
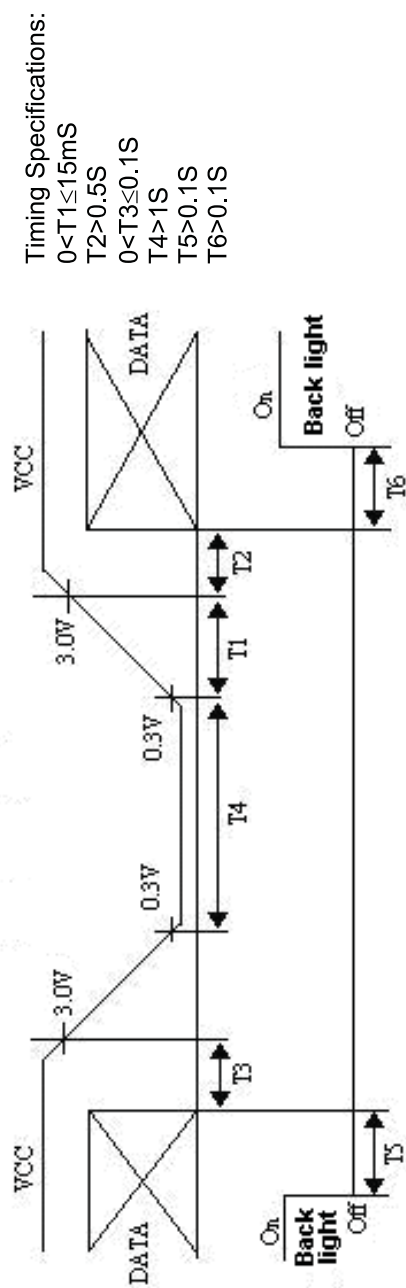
8.3 Color Data Input Assignment

Color		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
		Red						Green						Blue					
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale of Red	Red(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
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	Red(61)	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale of Green	Green(0)/ Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(61)	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0
	Green(62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	Green(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Gray Scale of Blue	Blue(0)/ Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue (1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue (2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue (61)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
	Blue (62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue (63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

	S960	S959	S958	S957	S956	S955	S954	S953	------------------------------	S002	S001
C001	B320	G320	R320	B319	G319	R319	B318	G318		G001	R001
C240	B320	G320	R320	B319	G319	R319	B318	G318		G001	R001

9. OPTICAL CHARACTERISTIC
9-1. Specification:

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Response time	Rise	Tr	$\theta=0°$	-	15	30	ms	Note 4
	Fall	Tf		-	35	50	ms	
Contrast ratio		CR	At optimized viewing angle	300	350			Note 5
Viewing angle	Top	$\theta y+$	CR≥5	60	70	-	Deg.	Note 6
	Bottom	$\theta y-$		40	50	-		
	Left	$\theta x-$		60	70	-		
	Right	$\theta x+$		60	70	-		
Brightness			$\theta=0°$	250	320	--	cd/m^2	Note 7
Uniformity				75	–		%	Note 9
White chromaticity		X	$\theta=0°$	0.25	0.30	0.35		Note 7
		y		0.30	0.35	0.40		

Note 1: Ambient temperature =25°C. LED current = 140 mA..
Note 2: To be measured in the dark room.
Note 3: To be measured on the center area of panel with a viewing cone of 1° by Topcon luminance meter BM-7A, after 10 minutes operation.
Note 4: Definition of response time:
The output signals of photo-detector are measured when the input signals are changed from "white" to "black"(rising time) and from "black" to "white"(falling time),respectively. The response time is defined as the time interval between the 10% and 90% of amplitudes.
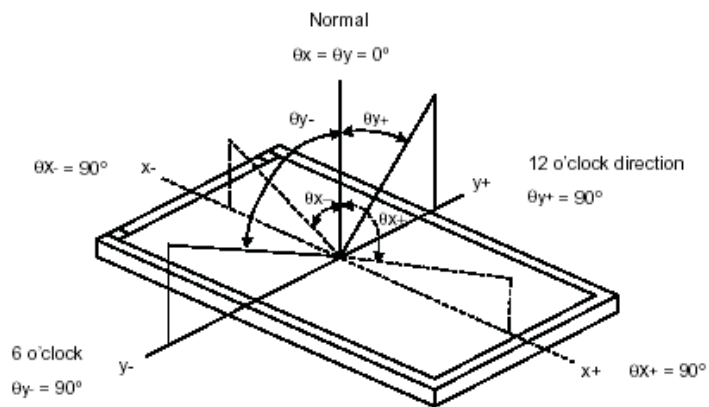Refer to figure as shown below.
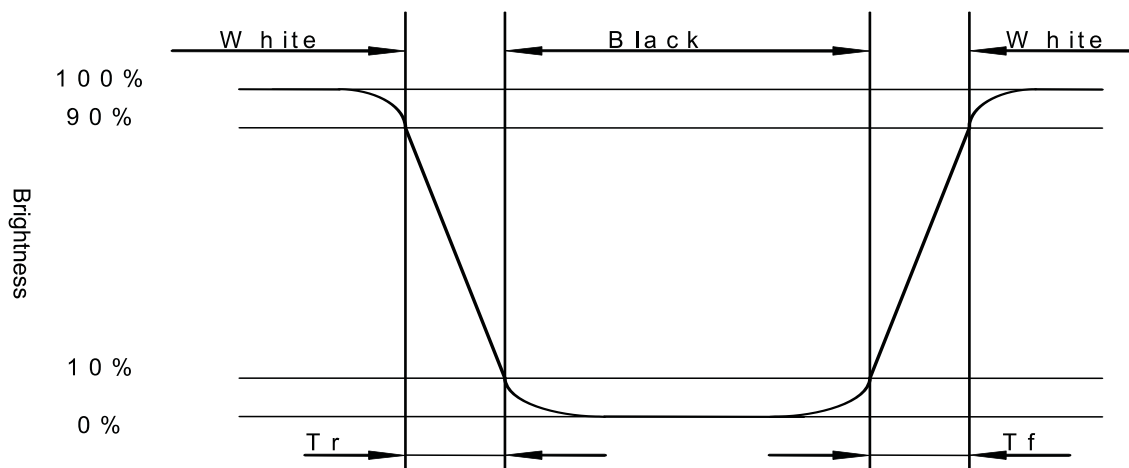
Note5: Definition of contrast ratio:
Contrast ratio is calculated with the following formula.

$$Contrast\ ratio\ (CR)=\frac{Photo\text{-}detector\ output\ when\ LCD\ is\ at\ “White”\ state}{Photo\text{-}detector\ output\ when\ LCD\ is\ at\ “Black”\ state}$$
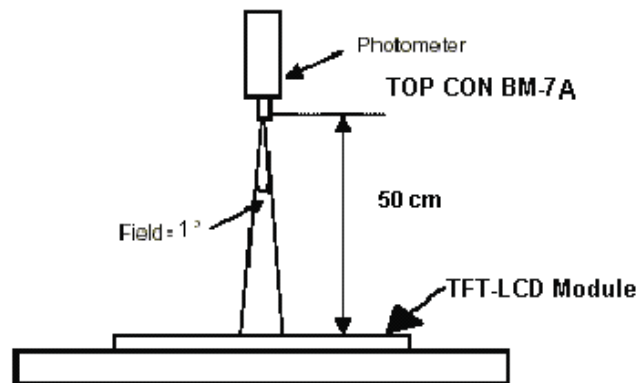
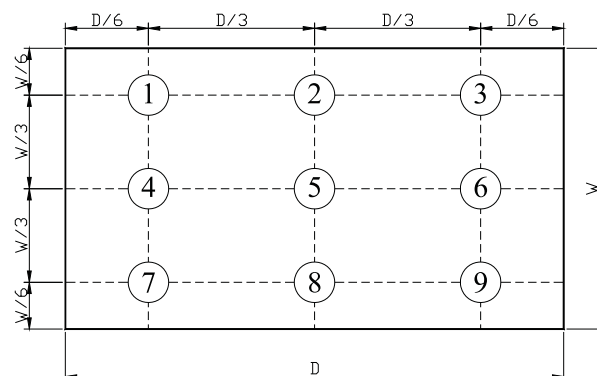Note 6: Definition of viewing angle:
　　　　　Refer to figure as below.

Note 7: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

Note8: The method of optical measurement:

Note9: Definition of Brightness Uniformity (Buni):

Luminance Measuring Points

$$\text{B-uni} = \frac{\text{Minimum luminance of 9 points}}{\text{Maximum luminance of 9points}}$$

10.TOUCH PANEL CHARACTERISTICS

1. Input Method and Activation Force

Input Method	Average Activation Force
0.8mm dia. Delrin stylus	20gf~150gf
8.0mm dia. Silicon "finger"	20gf~150gf

2. Typical Optical Characteristics

ITEM	Parameter
Visible Light Transmission	$\geq$78%
Hardness of surface	>3H

3. Electrical Specification

ITEM		Parameter
Operating Voltage		DC 5V
Contact current		According to individual design
Circuit close resistance	X	210Ω~440Ω
	Y	370Ω~770Ω
Circuit open resistance		$\geq$20MΩ at 25V DC
Contact bounce		$\leq$15ms
Linear Test		$\leq$1.5%

4. Linearity

ITEM		Parameter
Linear Test Specification Direction	X	$\leq$1.5%
	Y	$\leq$1.5%

5. Specification

ITEM	Parameter
Operating Temperature	-20$°$C~+70$°$C
Storage Temperature	-30$°$C~+80$°$C

6. Durability test:

6.1 Touch panel is hit 1 millions times with a
   silicone rubber of R8 finger, hitting rate is by
   250g at 2 times per second. The
   measurement must satisfy the following:

● Circuit close resistance: x 210Ω~440Ω ;
                            y 370Ω~770Ω
● Circuit open resistance: $\geq$20MΩ at 25V DC
● Contact bounce: $\leq$15ms
● Linearity test: $\leq$1.5%
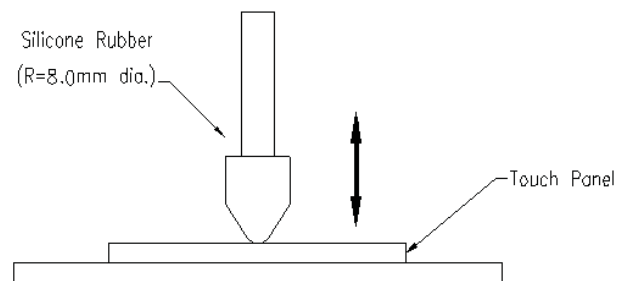
6.2 Stylus writing
   Touch panel is drawn by R0.8 Delrin stylus pen,
   at 250g forces, repeat one inch by 100k times.
   The measurement must satisfy the following:
● Circuit close resistance: x 210Ω~440Ω ;
                            y 370Ω~770Ω
● Circuit open resistance: $\geq$20MΩ at 25V DC
● Contact bounce: $\leq$15ms
● Linearity test: $\leq$1.5%

Silicone Rubber
(R=8.0mm dia.)

Touch Panel

Stylus Pen
(R=0.8mm dia.)

Touch Panel
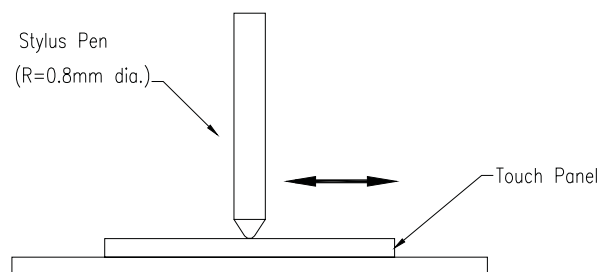
11. QUALITY ASSURANCE
11.1 Test Condition

11.1.1 Temperature and Humidity(Ambient Temperature)
Temperature   : $25 \pm 5°C$
Humidity   : $65 \pm 5\%$

11.1.2 Operation
Unless specified otherwise, test will be conducted under function state.

11.1.3 Container
Unless specified otherwise, vibration test will be conducted to the product itself without putting it in a container.

11.1.4 Test Frequency
In case of related to deterioration such as shock test.   It will be conducted only once.

11.1.5 Test Method

No.	Reliability Test Item & Level	Test Level
1	High Temperature Storage Test	T=80°C,240hrs
2	Low Temperature Storage Test	T=-30°C,240hrs
3	High Temperature Operation Test	T=70°C,240hrs
4	Low Temperature Operation Test	T=-20°C,240hrs
5	High Temperature and High Humidity Operation Test	T=60°C,90% RH,240hrs
6	Thermal Cycling Test (No operation)	-30°C → +25°C → +80°C,200 Cycles 30 min 5min 30 min
7	Vibration Test (No operation)	Frequency:0 ~ 55 Hz Amplitude:1.5 mm Sweep Time:11min Test Period:6 Cycles for each Direction of X,Y,Z
8	Electrostatic Discharge Test (No operation)	150pF,330Ω Air:± 15KV;Contact: ± 8KV 10 times/point;4 points/panel face

12. PRECAUTIONS IN USE LCM

1.   LIQUID CRYSTAL DISPLAY (LCD)
LCD is made up of glass, organic sealant, organic fluid, and polymer based polarizers. The following precautions should be taken when handing,
(1). Keep the temperature within range of use and storage. Excessive temperature and humidity could cause polarization degradation, polarizer peel off or bubble.
(2). Do not contact the exposed polarizers with anything harder than an HB pencil lead.   To clean dust off the display surface, wipe gently with cotton, chamois or other soft material soaked in petroleum benzin.
(3). Wipe off saliva or water drops immediately. Contact with water over a long period of time may cause polarizer deformation or color fading, while an active LCD with water condensation on its surface will cause corrosion of ITO electrodes.
(4). Glass can be easily chipped or cracked from rough handling, especially at corners and edges.
(5). Do not drive LCD with DC voltage.

2.   Liquid Crystal Display Modules
2.1   Mechanical Considerations
LCM are assembled and adjusted with a high degree of precision. Avoid excessive shocks and do not make any alterations or modifications. The following should be noted.
(1). Do not tamper in any way with the tabs on the metal frame.
(2). Do not modify the PCB by drilling extra holes, changing its outline, moving its components or modifying its pattern.
(3). Do not touch the elastomer connector, especially insert an backlight panel (for example, EL).
(4). When mounting a LCM make sure that the PCB is not under any stress such as bending or twisting . Elastomer contacts are very delicate and missing pixels could result from slight dislocation of any of the elements.
(5). Avoid pressing on the metal bezel, otherwise the elastomer connector could be deformed and lose contact, resulting in missing pixels.

2.2.   Static Electricity
LCM contains CMOS LSI's and the same precaution for such devices should apply, namely
(1). The operator should be grounded whenever he/she comes into contact with the module. Never touch any of the conductive parts such as the LSI pads, the copper leads on the PCB and the interface terminals with any parts of the human body.
(2). The modules should be kept in antistatic bags or other containers resistant to static for storage.
(3). Only properly grounded soldering irons should be used.
(4). If an electric screwdriver is used, it should be well grounded and shielded from commutator sparks.

(5) The normal static prevention measures should be observed for work clothes and working benches; for the latter conductive (rubber) mat is recommended.
(6). Since dry air is inductive to statics, a relative humidity of 50-60% is recommended.

2.3   Soldering
(1). Solder only to the I/O terminals.
(2). Use only soldering irons with proper grounding and no leakage.
(3). Soldering temperature :   280°C ± 10°C
(4). Soldering time: 3 to 4 sec.
(5). Use eutectic solder with resin flux fill.
(6). If flux is used, the LCD surface should be covered to avoid flux spatters. Flux residue should be removed after wards.

2.4   Operation
(1). The viewing angle can be adjusted by varying the LCD driving voltage V0.
(2). Driving voltage should be kept within specified range; excess voltage shortens display life.
(3). Response time increases with decrease in temperature.
(4). Display may turn black or dark blue at temperatures above its operational range; this is (however not pressing on the viewing area) may cause the segments to appear "fractured".
(5). Mechanical disturbance during operation (such as pressing on the viewing area) may cause the segments to appear "fractured".

2.5 Storage
If any fluid leaks out of a damaged glass cell, wash off any human part that comes into contact with soap and water. Never swallow the fluid. The toxicity is extremely low but caution should be exercised at all the time.

13. OUTLINE DRAWING

CN 1 define

1. GND	12. GND	23. B3
2. CLK1	13. G0	24. B4
3. HS(HSYNC)	14. G1	25. B5
4. VS(VSYNC)	15. G2	26. GND
5. GND	16. G3	27. DE
6. R0	17. G4	28. VCC
7. R1	18. G5	29. VCC
8. R2	19. GND	30. R/L
9. R3	20. B0	31. U/D
10. R4	21. B1	32. NC
11. R5	22. B2	33. GND

CN 3 define

1. SPENA	9. D2
2. SPCK	10. D1
3. SPDA	11. D0
4. D7	12. DGND
5. D6	13. CLK
6. D5	14. DGND
7. D4	15. DVDD
8. D3	16. DVDD

TP FPC define

1. YU
2. XL
3. YD
4. XR

Detail C
CN2 definition

LED K (Black)
LED A (Red)

Distance From TP To Bottom Bezel
Detail B
Scale 3/1

Detail A
Scale 3/1

Note: 1. Tolerance is ±0.5 unless otherwise noted.
2. CN 1 connector: 08-6210-033-340-800(ELCO) or equivalent
3. CN 2 connector: BHSR-02VS-1(JST) or equivalent
4. Brightness : 320cd/m² (Typ)
5. for RoHS
6. TP connector: JST 04FFS-SP-TF or equivalent
7. * is important dimension.

		DATE:		10/09/09'	TITLE:	LMTDA057BQN1-4R21
		DRAWN:			DWG. NO.	
		CHECK:		03/26/10'	UNITS MM	REV. A
		APPROVE:	APPROVED	DATE	SCALE Scale	SHEET 1 OF 1
AUTH		DESCRIPTION				
		REVISIONS				

14 .Inspection Specifications

The buyer (customer) shall inspect the modules within twenty calendar days since the delivery date (the "inspection period") at its own cost. The results of the inspection (acceptance or rejection) shall be recorded in writing, and a copy of this writing will be promptly sent to the seller.

The buyer may, under commercially reasonable reject procedures, reject an entire lot in the delivery involved if, within the inspection period, such samples of modules within such lot show an unacceptable number of defects in accordance with this incoming inspection standards, provided however that the buyer must notify the seller in writing of any such rejection promptly, and not later than within three business days of the end of the inspection period.

Should the buyer fail to notify the seller within the inspection period, the buyer's right to reject the modules shall be lapsed and the modules shall be deemed to have been accepted by the buyer.

15. Warranty

Inteltronic Inc. warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for one year from the date of purchase.

Inteltronic Inc. will be limited to replace or repair any of its module which is found and confirmed defective electrically or visually when inspected in accordance with Inteltronic Inc. general module inspection standard.

This warranty does not apply to any products which have been on customer's production line, repaired or altered by persons other than repair personnel authorized by Inteltronic Inc., or which have been subject to misuse, abuse, accident or improper installation. Inteltronic Inc. assumes no liability under the terms of this warranty as a consequence of such events.

If an Inteltronic Inc. product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. In returning the modules, they must be properly packaged with original package; there should be detailed description of the failures or defect.

16. RMA

Products purchased through Inteltronic Inc. and under warranty may be returned for replacement. Contact support@inteltroincinc.com for RMA number and procedures

Office Locations

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