3.5 inch TFT LCD
with Touch Panel
SPECIFICATION

MODEL NAME: LMTO2035CHN1- 4RA1

Date: 2013 / 10 / 18

Customer Signature		
Customer		
Approved Date	**Approved By**	**Reviewed By**

C O N T E N T S

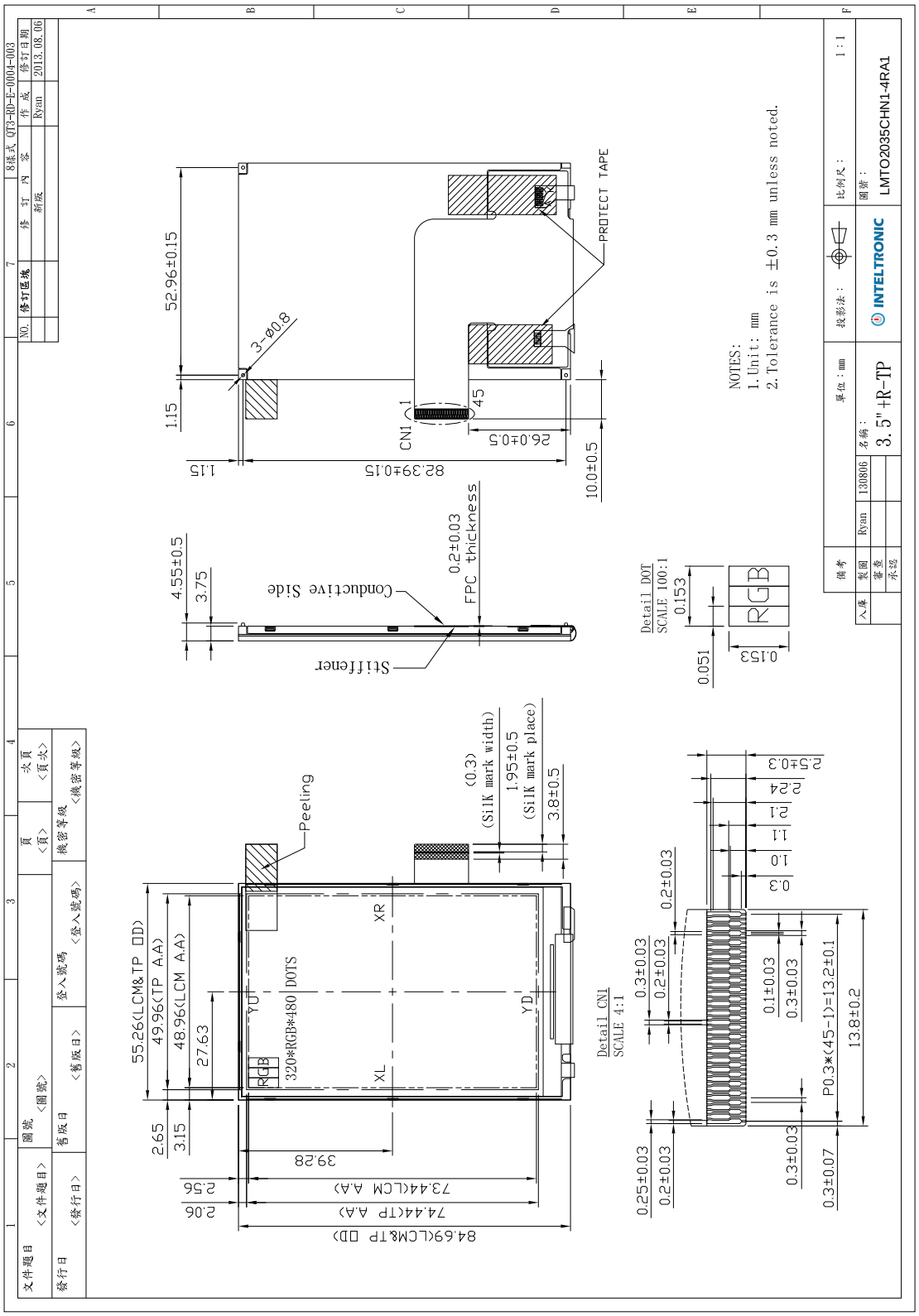
1.RECORD OF REVISION

REV	DATE	PAGE	SUMMARY
0.1	2013.10.18	ALL	Preliminary specification was first issued.

2.MECHANICAL SPECIFICATIONS

(1)	Number Of Dots (Dots)	320(R.G.B) X 480
(2)	Module Size(mm)	55.26(H) X 84.69(V) X4.55(D)
(3)	Active Area(mm)	48.96 (H) X 73.44 (V)
(4)	Pixel Pitch(mm)	0.153 (H) X 0.153 (V)
(5)	LCD / Polarizer Model	TFT , Transmissive, Normally/Black, Anti-Glare
(6)	Backlight Color	White, LED
(7)	Viewing Direction	Wide Viewing Angle Horizontal：Right side 80°(typ.), Left side 80°(typ.) Vertical：Up side 80°(typ.), Down side 80°(typ.)
(8)	Gray Scale Inversion Direction	No GSI
(9)	Electrical Interface	RGB or 8/9/16/18 Parallel
(10)	Color Configuration	R.G.B Stripe
(11)	Driver IC	Himax HX8357-C01
(12)	Module Weight(g)	T.B.D.

3. OUTLINE DIMENSIONS



4. INTERFACE PIN CONNECTION

4.1 LCM PANEL DRIVING SECTION

Mating Connector : HRS FH39-45S-0.3SHW or Equivalent

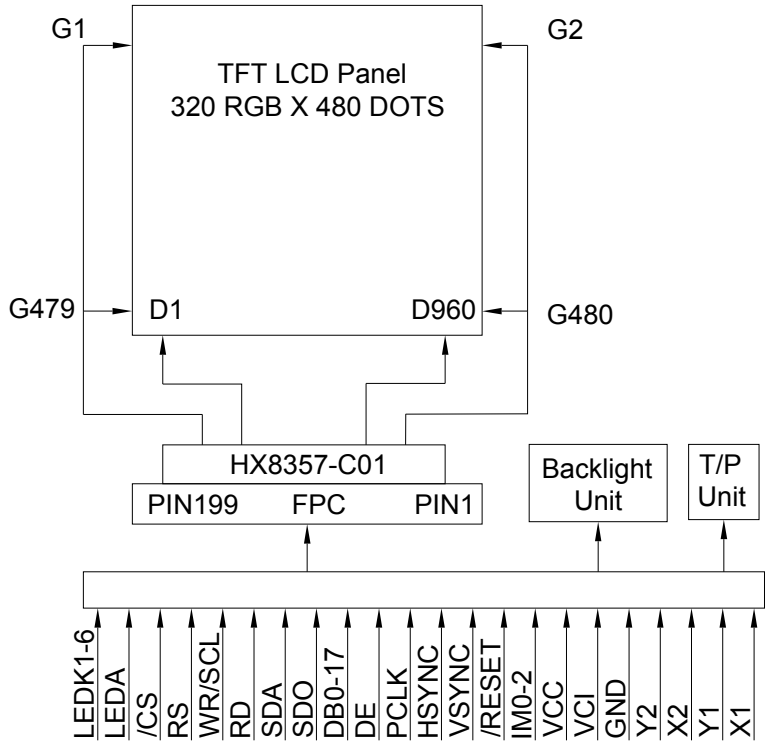
PIN NO.	SIGNAL	FUNCTION
1	LEDA	Anode for LED
2	LEDK1	Cathode for LED
3	LEDK2	Cathode for LED
4	LEDK3	Cathode for LED
5	LEDK4	Cathode for LED
6	LEDK5	Cathode for LED
7	LEDK6	Cathode for LED
8	GND	Ground
9	/CS	Chip select signal Low: chip can be accessed. High: chip cannot be accessed. Fix it to VCC when not used.
10	RS	DBI Type-B, Type-C Option 3: Data/Command Selection pin If not used, please fix this pin at VCC or GND level.
11	WR/SCL	DBI Type-B: Serves as a write signal and write data at the low level. DBI Type-C: it servers as SCL (Serial Clock). Fix it to VCC or GND level when not used.
12	RD	DBI Type-B: Serves as a read signal and read data at the low level If not used, please fix this pin at VCC or GND level
13	GND	Ground
14	SDA	Serial data input pin and output pin in serial bus system interface. The data is inputted on the rising edge of the SCL signal. If not used, please let it open.
15	SDO	Serial data output
16	GND	Ground
17	DB0	Data bus
18	DB1	Data bus
19	DB2	Data bus
20	DB3	Data bus
21	DB4	Data bus
22	DB5	Data bus

23	DB6	Data bus
24	DB7	Data bus
25	DB8	Data bus
26	DB9	Data bus
27	DB10	Data bus
28	DB11	Data bus
29	DB12	Data bus
30	DB13	Data bus
31	DB14	Data bus
32	DB15	Data bus
33	DB16	Data bus
34	DB17	Data bus
35	GND	Ground
36	DE	A data enable signal in DPI I/F mode. Let to open or connected to VSSD.
37	PCLK	Data enable signal in DPI interface. Let to open or connected to GND.
38	HSYNC	Horizontal synchronizing signal in DPI interface. Let to open or connected to GND.
39	VSYNC	Horizontal synchronizing signal in DPI interface. Let to open or connected to GND.
40	/RESET	Reset pin. Setting either pin low initializes the LSI. Must be reset after power is supplied.
41	IM2	System interface select (Note 1)
42	IM1	System interface select (Note 1)
43	IM0	System interface select (Note 1)
44	VCC	Digital power supply voltage
45	VCI	Analog power supply voltage
46	GND	Ground
47	Y2	Y up
48	X2	X right
49	Y1	Y bottom
50	X1	X left

Note 1:

IM2	IM1	IM0	INTERFACE
0	0	0	DBI Type-B 18-bit
0	0	1	DBI Type-B 9-bit
0	1	0	DBI Type-B 16-bit
0	1	1	DBI Type-B 8-bit
1	0	0	MDDI+DBI Type-C Option 1
1	0	1	DBI Type-C Option 1+DPI
1	1	0	MIPI DSI Command Mode MIPI DSI Vedio Mode
1	1	1	DBI TYPE-C Option 3+DPI

5. BLOCK DIAGRAM



6. ABSOLUTE MAXIMUM RATINGS

6.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS

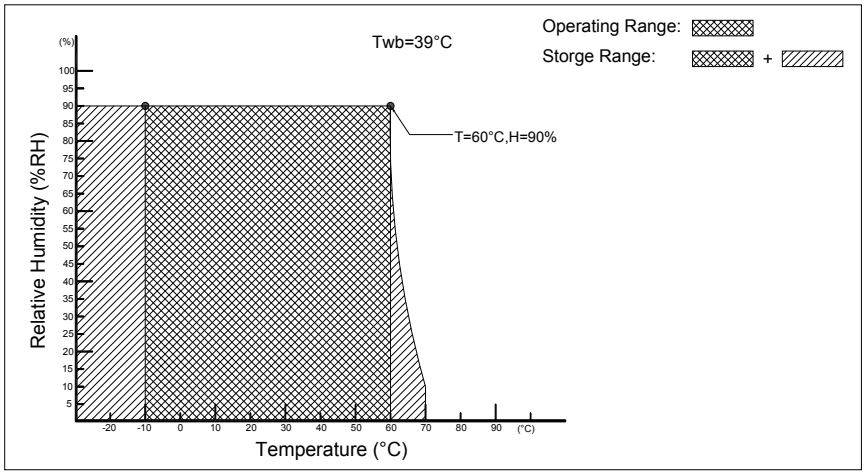
ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
Supply Voltage	VCC	-0.3	+4.6	V	
	VCI	-0.3	+4.6	V	
Logic Input Voltage	VI	-0.3	VCC+0.5	V	

6.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE		REMARK
	MIN.	MAX.	MIN.	MAX.	
Ambient Temperature(℃)	-10	60	-20	70	Note 1,2
Humidity(% RH)	5	90	5	90	Note 3

Note 1 : The response time will become lower when operated at low temperature.
Note 2 : Background color changes slightly depending on ambient temperature.

Note 3


Twb=39°C
Operating Range:
Storge Range:
+
T=60°C,H=90%
Relative Humidity (%RH)
(%)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
-20
-10
0
10
20
30
40
50
60
70
80
90
(°C)
Temperature (°C)

7. ELECTRICAL CHARACTERISTICS

7.1 ELECTRICAL CHARACTERISTICS OF LCD

Ta=25℃

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
Power Voltage For LCD	VCC	2.7	3.0	3.3	V	
	VCI	2.5	2.8	3.3	V	
	ICC	-	12	13.2	mA	Note 1
Input High Voltage	VIH	0.7*VCC	-	VCC	V	
Input Low Voltage	VIL	GND	-	0.3*VCC	V	
Output High Voltage	VOH	0.8*VCC	-	VCC	V	
Output Low Voltage	VOL	GND	-	0.2*VCC	V	

Note 1：Test condition：VCC=3.3V；Test Pattern：White.

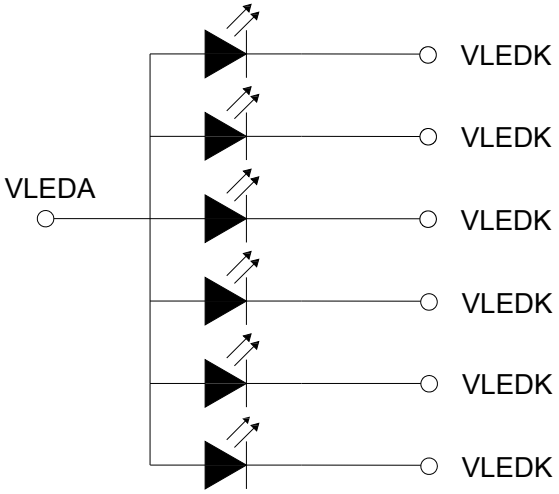
7.2 BACKLIGHT UNITS

Ta=25℃

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
LED Driving Voltage	VLED	-	3.2	3.6	V
	ILED	-	120	-	mA

Note 1: The figure below shows the connection of backlight LED

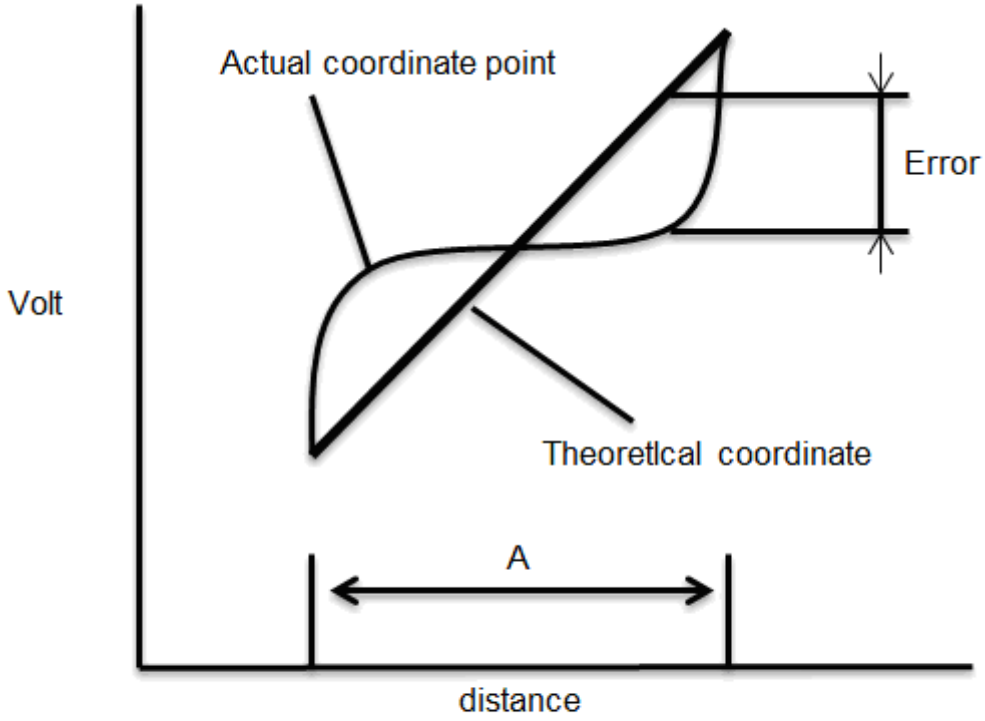
.



8. TOUCH PANEL SPECIFICATIONS

ITEM	SPECIFICATIONS	REMARK
Working Voltage	DC 10V Max.	
Resistance	X axis : 150Ω~550Ω	
Resistance	Y axis : 300Ω~850Ω	
Linearity	≦1.5%	Note 1
Response	≦10ms	
operation force	10g~100g	

Note 1.Differenca between actual voltage & theoretical voltage is an error at ant points
Linearity is the value max .error voltage divide by voltage difference on active area inside 2mm.



A : Guaranteed active area

9. OPTICAL CHARACTERISTICS

Ta=25℃

ITEM		SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT	REMARK
Contrast Ratio		CR	Viewing Normal Angle Θx=Θy=0°	-	700	-	-	Note 1
Response Time		TR+TF		-	30	-	ms	Note 2
Chromaticity	White	x		(0.256)	(0.306)	(0.356)	-	Note 4
		y		(0.268)	(0.318)	(0.368)	-	
Viewing Angle	Hor.	θx+	Viewing Angle Θx=Θy=0° CR≧10	70	80	-	Deg.	Note 3
		θx -		70	80	-		
	Ver.	θy+		70	80	-		
		θy -		70	80	-		
Luminance		L	ILED=120mA	200	240	-	cd/m2	
Luminance Uniformity		YU		70	-	-	%	Note 5

Note 1：Definition of Contrast Ratio (CR)：

The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR) = L63/L0

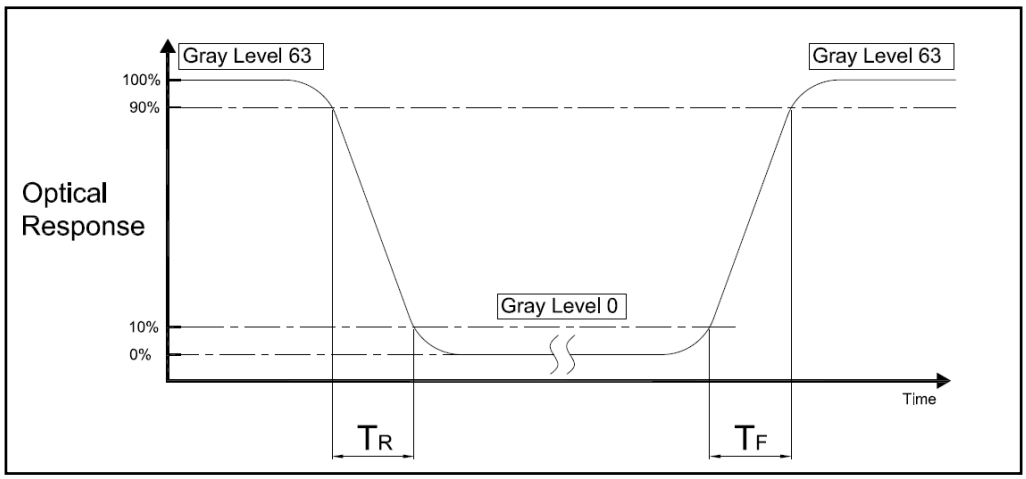
L63：Luminance of gray level 63

L0：Luminance of gray level 0

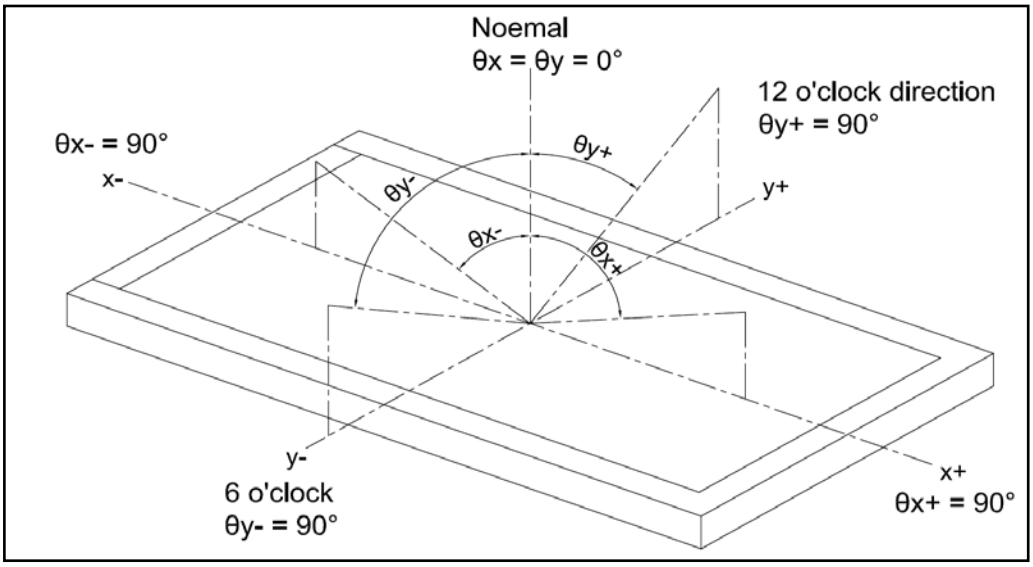
CR = CR(5)

CR(X) is corresponding to the Contrast Ratio of the point X at Figure in Note 5

Note 2：Definition of Response Time (TR.TF)

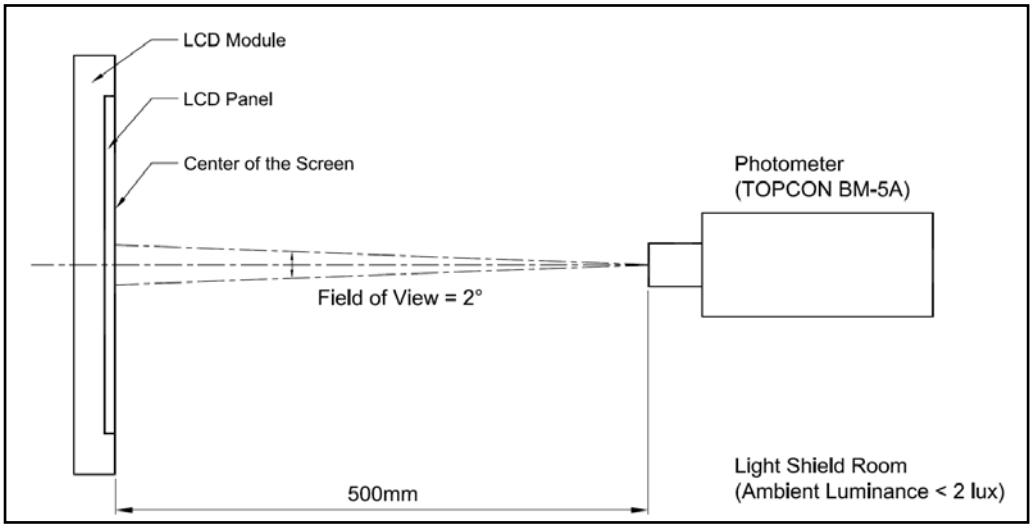


Note 3：Definition of Viewing Angle

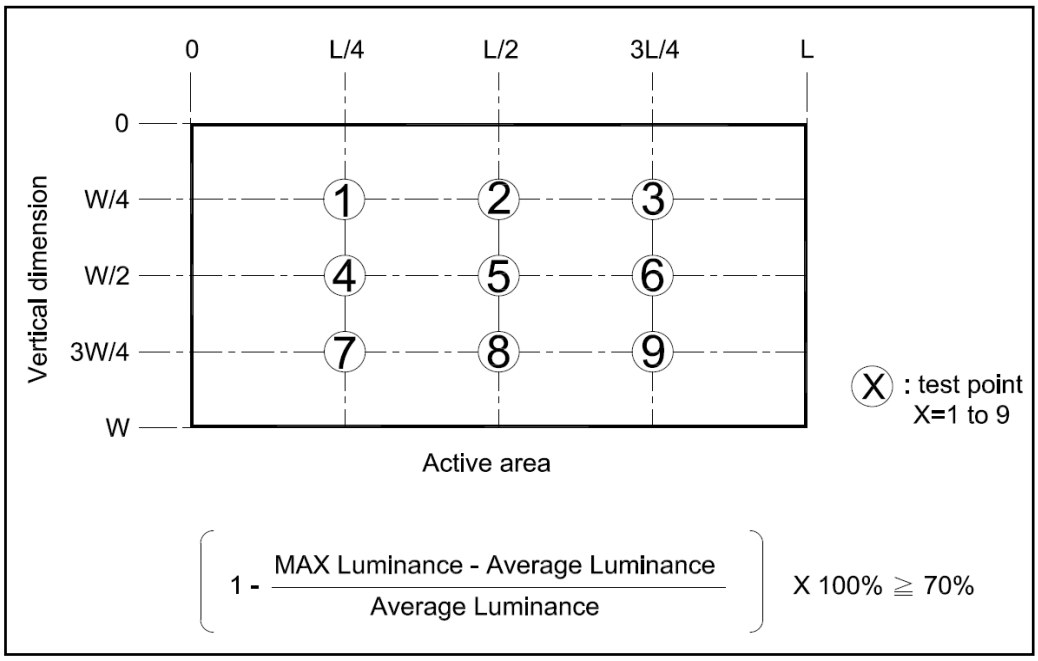


Note 4：Measurement Set-Up:

The LCD module should be stabilized at a given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.

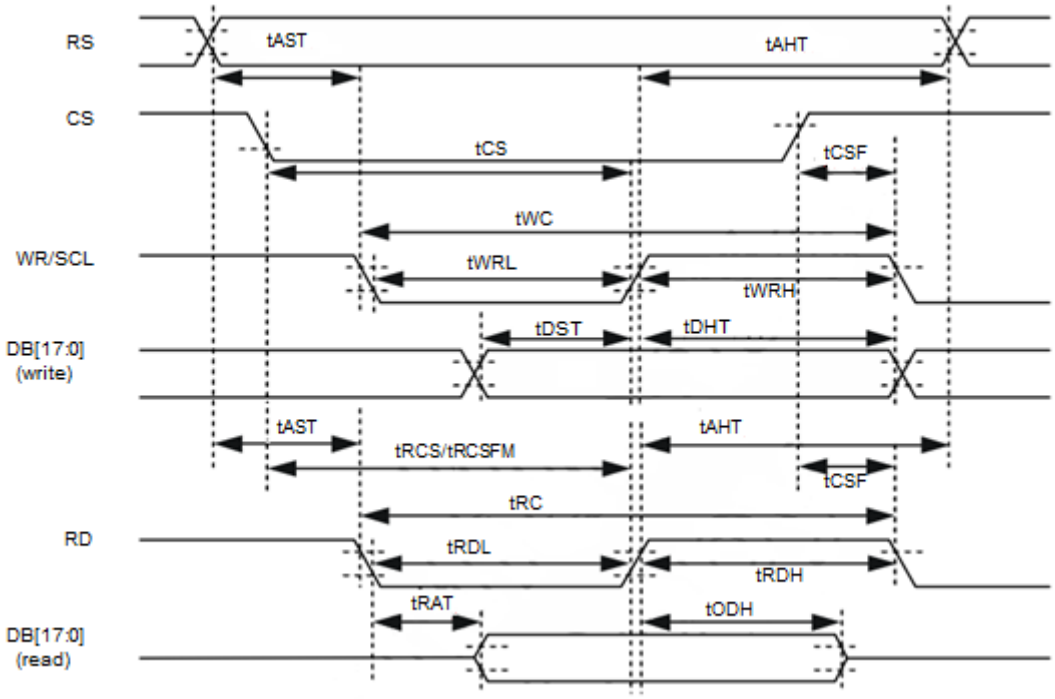


Note 5：


0
L/4
L/2
3L/4
L
0
W/4
W/2
3W/4
W
Vertical dimension
1
2
3
4
5
6
7
8
9
Active area
X : test point
X=1 to 9
1 - MAX Luminance - Average Luminance / Average Luminance
X 100% ≧ 70%

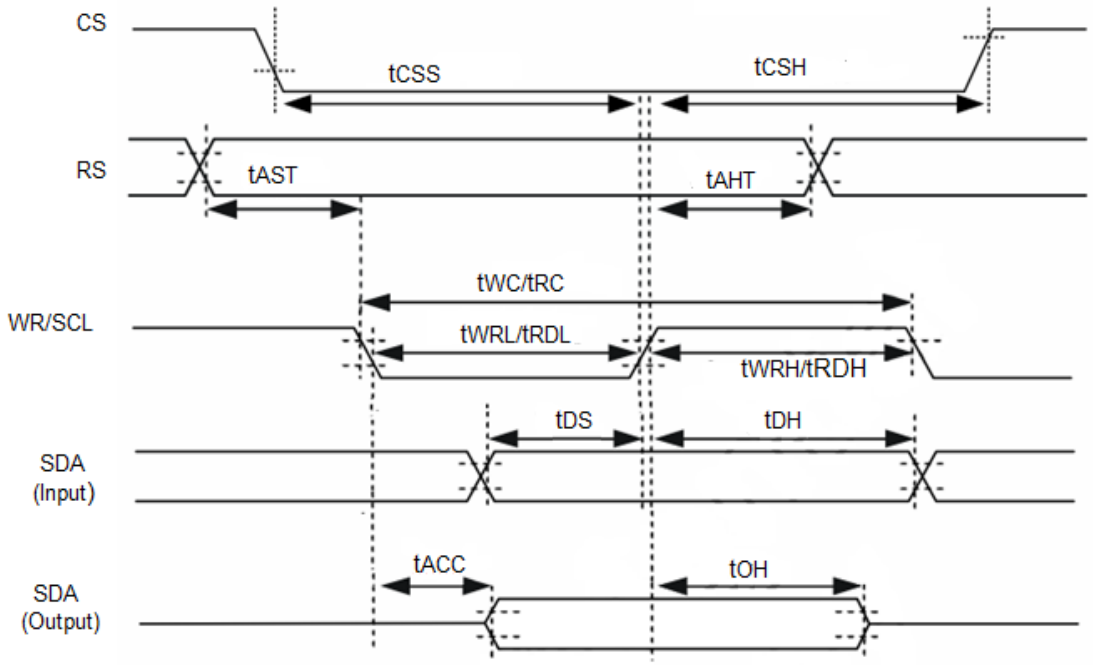
10. TIMING SPECIFICATIONS

10.1 DBI TYPE-B INTERFACE CHARACTERISTIC



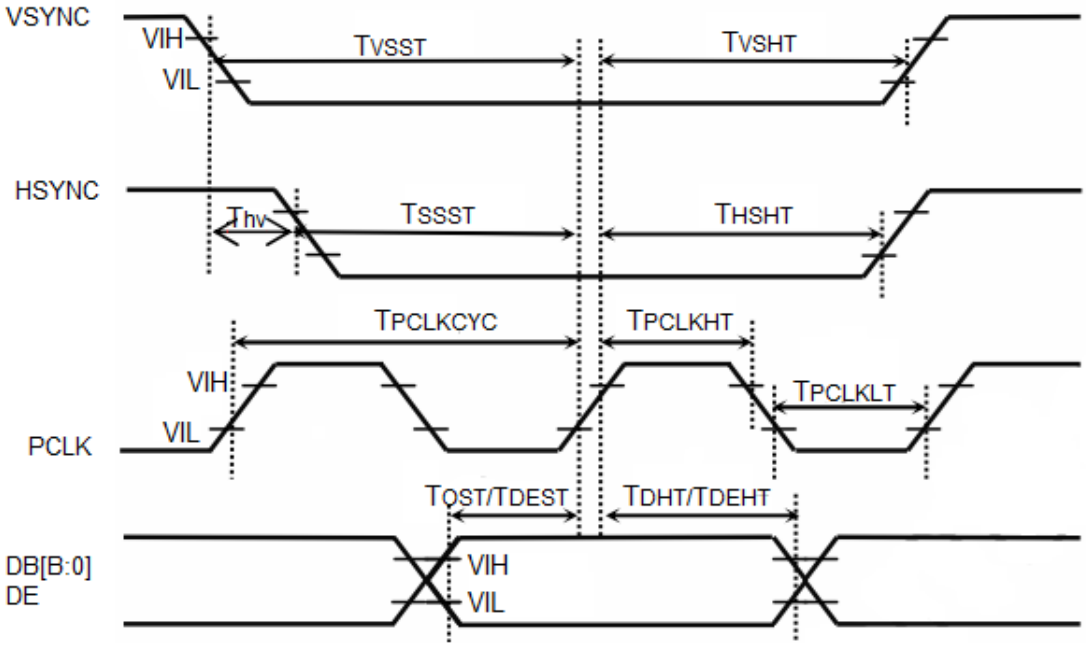
ITEM	SYMBOL	PARAMETER	MIN.	MAX.	UNIT	REMARK
RS	tAST	Address setup time	0	-	ns	
	tAHT	Address hold time (Write/Read)	10	-		
CS	tCS	Chip select setup time (Write)	10	-	ns	
	tRCS	Chip select setup time (Read register)	45	-		
	tRCSFM	Chip select setup time (GRAM)	355	-		
	tCSF	Chip select wait time (Write/Read)	10	-		
WR/ SCL	tWC	Write cycle (write register)	50	-	ns	
	tWC	Write cycle (write GRAM@SLPOUT)	47	-		
	tWC	Write cycle (write GRAM@SLPIN)	100	-		
	tWRH	Control pulse “H” duration	15	-		
	tWRL	Control pulse “L” duration	15	-		
RD	tRC	Read cycle (read register)	160	-	ns	
	tRC	Read cycle (GRAM)	450	-		
	tRDH	Control pulse “H” duration	90	-		
	tRDL	Control pulse “L” duration (read register)	35	-		
	tRDL	Control pulse “L” duration(GRAM)	345	-		
DB [17:0]	tDST	Data setup time	10	-	ns	For maximum CL =30pF For minimum CL =8pF
	tDHT	Data hold time	10	-		
	tRAT	Read access time(read register)	-	40		
	tRAT	Read access time(GRAM)	-	340		
	tODH	Output disable time	20	80		

10.2 DBI TYPE-C INTERFACE CHARACTERISTIC



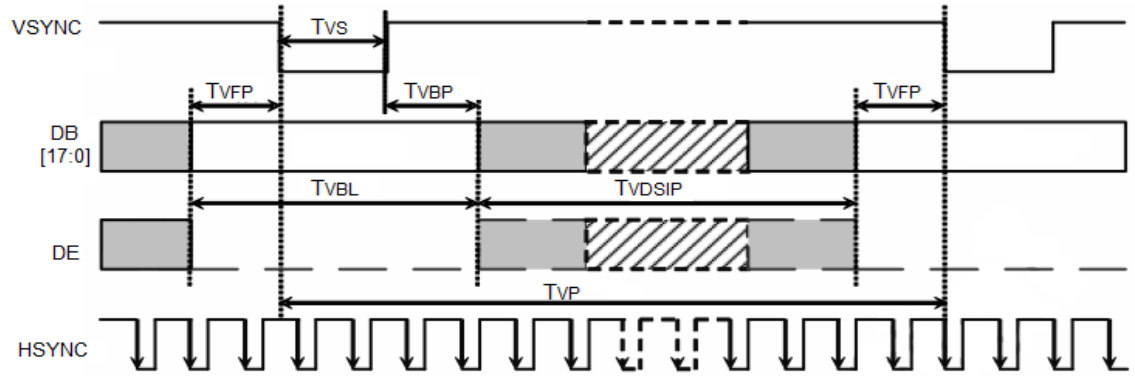
ITEM	SYMBOL	PARAMETER	MIN.	MAX.	UNIT	REMARK
CS	tCSS	Chip select setup time (Write)	15	-	ns	
	tCSS	Chip select setup time (Read)	60	-		
	tCSH	Chip select hold time (Write)	15	-		
	tCSH	Chip select hold time (Read)	65	-		
RS	tAST	Address setup time	0	-	ns	
	tAHT	Address hold time (Write/Read)	10	-		
WR/SCL (Write)	tWC	Write cycle	66	-	ns	
	tWRH	Control pulse “H” duration	15	-		
	tWRL	Control pulse “L” duration	15	-		
WR/SCL (Read)	tRC	Read cycle	150	-	ns	
	tRDH	Control pulse “H” duration	60	-		
	tRDL	Control pulse “L” duration	60	-		
SDA (Input)	tDS	Data setup time	10	-	ns	For maximum CL =30pF For minimum CL =8pF
	tDH	Data hold time	10	-		
SDA (Output)	tACC	Read access time	10	50	ns	
	tOH	Output disable time	15	50		

10.3 DPI INTERFACE CHARACTERISTICS



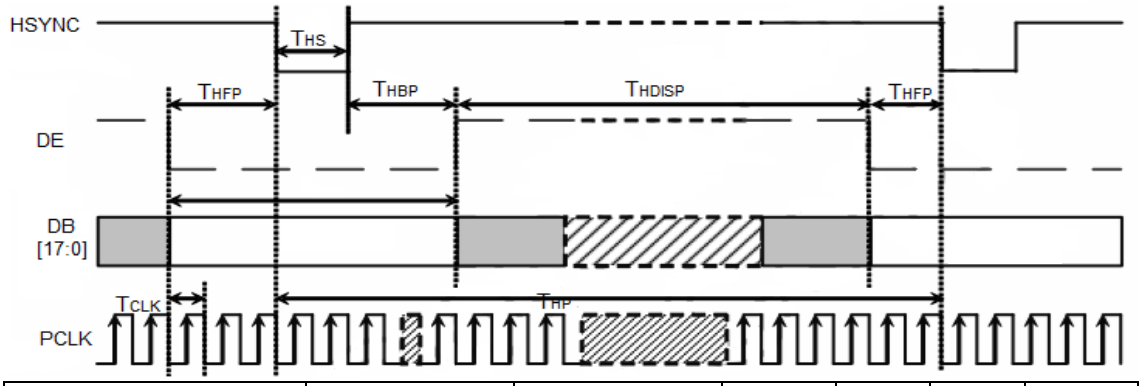
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Pixel low pulse width	TCLKLT	-	15	-	-	ns
Pixel high pulse width	TCLKHT	-	15	-	-	ns
Vertical Sync. set-up time	TVSST	-	15	-	-	ns
Vertical Sync. hold time	TVSHT	-	15	-	-	ns
Horizontal Sync.set-up time	THSST	-	15	-	-	ns
Horizontal Sync. hold time	THSHT	-	15	-		ns
Data Enable set-up time	TDEST	-	15		-	ns
Data Enable hold time	TDEHT	-	15	-	-	ns
Data set-up time	TDST	-	15	-	-	ns
Data hold time	TDHT	-	15	-	-	ns
Phase difference of sync signal falling edge	Thv	-	0	-	320	pclk

10.3.1 Vertical Timing for RGB I/F



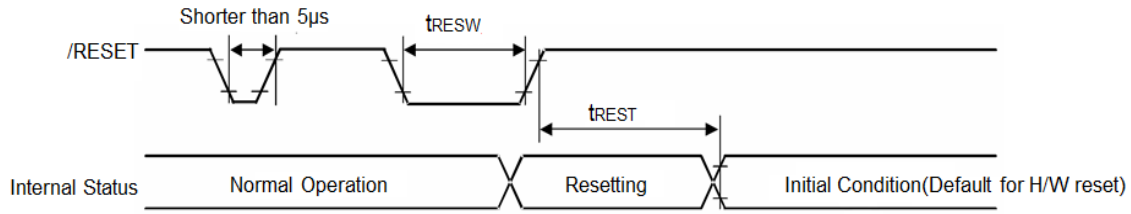
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Vertical cycle period	TVP	-	486	-	-	HS
Vertical low pulse width	TVS	-	2	-	-	HS
Vertical front porch	TVFP	-	2	-	-	HS
Vertical back porch	TVBP	-	2	-	-	HS
Vertical blanking period	TVBL	TVBP+ TVFP	6	-	-	HS
Vertical active area	TVDISP	-	-	480	-	HS
Vertical refresh rate	TVRR	Frame rate	50	60	70	Hz

10.3.2 Horizontal Timing for RGB I/F



ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Horizontal cycle period	THP	-	326	-	-	PCLK
Horizontal low pulse width	THS	-	2	-	-	PCLK
Horizontal front porch	THFP	-	2	-	-	PCLK
Horizontal back porch	THBP	-	2	-	-	PCLK
Horizontal blanking period	THBL	THBP+ THFP	6	-	-	PCLK
Horizontal active area	THDISP	-	-	320	-	PCLK
Pixel clock cycle TVRR=60Hz	fCLKCYC	-	9	-	-	MHz

10.4 RESET INPUT TIMING



SYMBOL	PARAMETER	RELATED PINS	MIN.	TYP.	MAX.	UNIT	REMARK
tRESW	Reset low pulse width	/RESET	10	-	-	μs	-
tREST	Reset complete time	-	5	-	-	ms	When reset applied during SLPIN mode
		-	120	-	-	ms	When reset applied during SLPOUT mode

11. RELIABILITY TEST

ENVIRONMENTAL TEST				
NO.	ITEM	CONDITIONS	TIME PERIOD	REMARK
1	High Temperature Storage	70℃	96HRS	
2	Low Temperature Storage	-20℃	96HRS	
3	High Temperature Operation	60℃	96HRS	
4	Low Temperature Operation	-10℃	96HRS	
5	Temperature Cycle	-10℃←25℃→60℃ (30min) (5min) (30min)	10CYCLE	
6	High Temperature Humidity Storage	60℃ 90%RH	96HRS	

NOTE 1：a. The module should word properly.

b. Before and after function test, The difference of consumptive current. Should be within 10%.

NOTE 2：a. The module should work properly.

b. The module won't be deformative, Color changeable or broken.

c. The modules can't be apart.

NOTE 3：a. Before cosmetic and function test, The product must have enough recovery time, At least 2 hours at room temperature.

11.1 VIBRATION TEST：

11.1.1 STATE LABORATORY ENVIRONMENT：

Room temperature： 25±3℃
Relative humidity：55±20％RH

11.1.2 TEST METHOD / SPECIFICATION：

Sample Status： Non-packaged single state
Waveform： Sine
Frequency：10~55~10Hz
Full amplitude：1.5mm
Vibration direction：X,Y,Z Axis (3 Axial)
Test time： Each 2Hour / X,Y,Z Axis， Altogether 6 Hour

11.2 MECHANICAL SHOCK TEST：

11.2.1 STATE LABORATORY ENVIRONMENT：

Room temperature： 25±3℃
Relative humidity：55±20％RH

11.2.2 TEST METHOD / SPECIFICATION：

Sample Status： Non-packaged single state
Waveform： Half-sine
Acceleration：80G
Shock Time：6ms
Impact direction：6 Directions (±X, ±Y, ±Z axes)
Number of shocks： Each direction 3 Secondary， Altogether 18 Secondary

12.PRECAUTIONS FOR USE

12.1 SAFETY

(1) Do not swallow any liquid crystal, even if there is no proof that liquid crystal is poisonous.
(2) If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
(3) If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

12.2 STORAGE CONDITIONS

(1) Store the panel or module in a dark place where the temperature is 23±5°C and the humidity is below 50±20%RH.
(2) Store in anti-static electricity container.
(3) Store in clean environment, free from dust, active gas, and solvent.
(4) Do not place the module near organics solvents or corrosive gases.
(5) Do not crush, shake, or jolt the module.

12.3 HANDLING PRECAUTIONS

(1) Avoid static electricity which can damage the CMOS LSI.
(2) The polarizing plate of the display is very fragile. So, please handle it very carefully.
(3) Do not give external shock.
(4) Do not apply excessive force on the surface.
(5) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the Surface of plate.
(6) Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
(7) Do not operate it above the absolute maximum rating.
(8) Do not remove the panel or frame from the module.
(9) When the module is assembled, it should be attached to the system firmly, Be careful not to twist and bend the module.
(10) Wipe off water droplets or oil immediately . If you leave the droplets for a long time, staining and discoloration may occur.
(11) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs or clothes, it must be washed away thoroughly with soap.

13 .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.

14. 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.

15. RMA

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

Office Locations

INTELTRONIC

Inteltronic Inc.
www.inteltronicinc.com
Office: 510-471-9900
Fax: 510-471-9901
Address: 29470 Union City Blvd
Union City, CA 94587

www.wahlee.com
Wah Lee Industrial Corp.
HSINCHU OFFICE
18F, No.8, Zihciang S. Rd., Jhubei,
Hsinchu 302, Taiwan, R.O.C.
Tel : 886-3-6205880
FAX: 886-3-6205833