SPECIFICATION

OF

LIQUID CRYSTAL DISPLAY MODULE

UNITED RADIANT TECHNOLOGY CORP.
光聯科技
5-Jan-2006
品管部
QC DEPT.

CUSTOMER : U.R.T STANDARD

Model No. : UMSH-7780MD-T

Model version : 0

Document Revision : 0

CUSTOMER APPROVED SIGNATURE			

This specification need to be signed by purchaser or customer as a specification of products production and delivery from URT. Without signature of this specification , any purchase order for this model no. will be treated and considered that this specification is automatically acknowledged and accepted by purchaser or customer.

U.R.T. UNITED RADIANT TECHNOLOGY CORP.

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APPROVED	CHECKED	CHECKED	PREPARED	Date

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Revision record

Document Revision	Model No. Version No.	Description	Revision by
0	UMSH-7780MD-T (UFSH-K026EY-FT) Version No. 0		Brandon Wu Mars Chang 5-Jan-2006

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1. BASIC SPECIFICATION

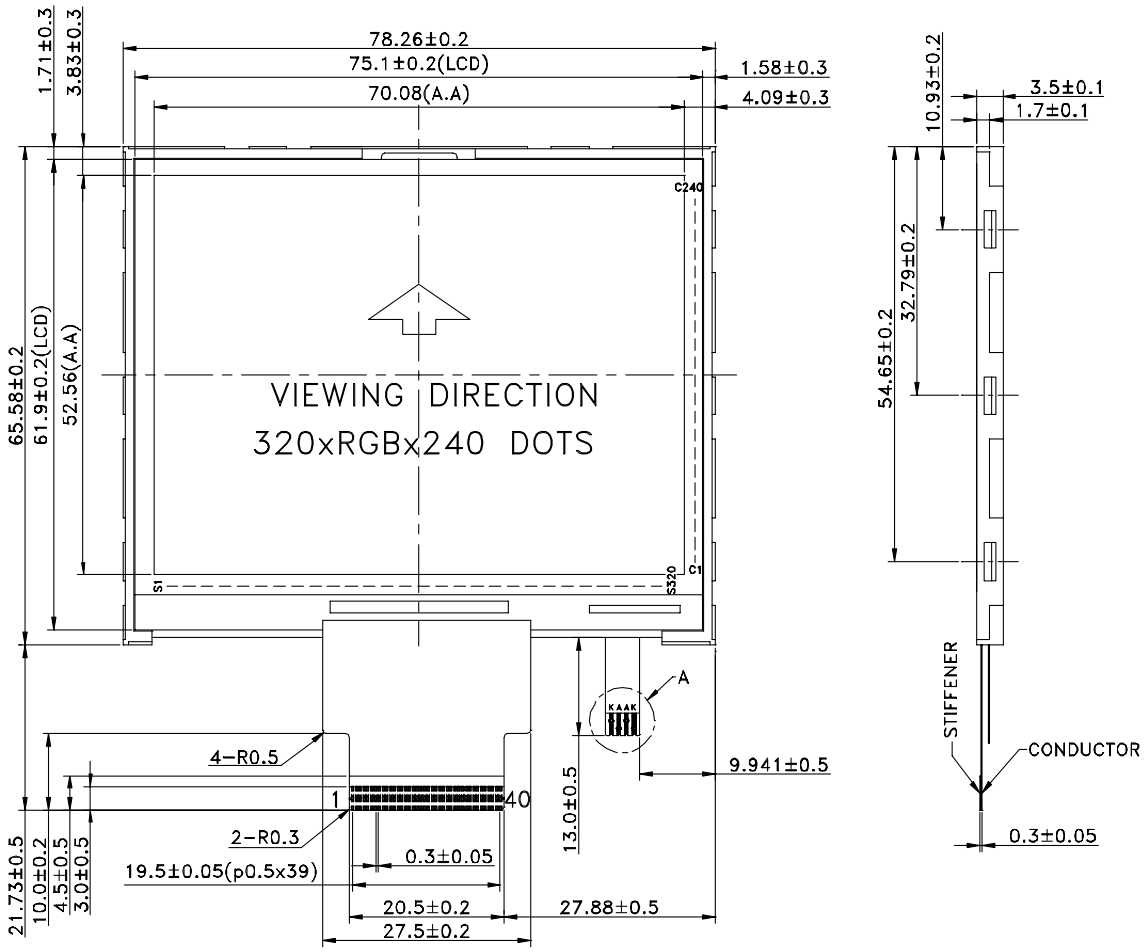
1.1 Mechanical specifications

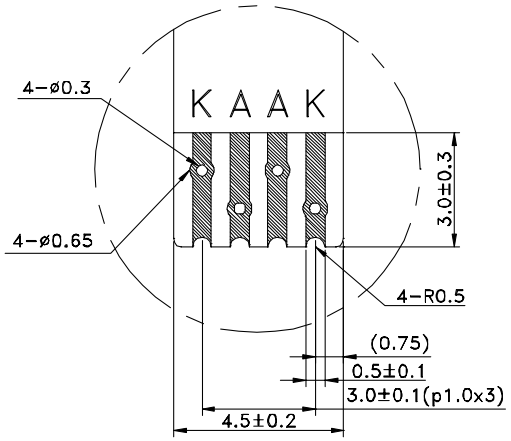
Items	Nominal Dimension	Unit
Dot Matrix	320 x RGB x 240	-
Module Size (W x H x T)	78.26 x 65.6 x 3.5	mm.
Active Area (W x H)	70.08 x 52.6	mm.
Pixel Size(Wx H)	73 x 219	um.
Pixel Driving Element	a-Si TFT	-
Driving IC Package	COG	-

1.2 Display specification

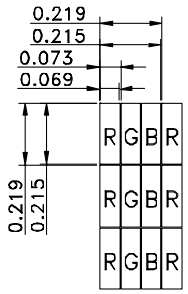
Display	Descriptions	Note
LCD Type	TFT	
LCD Mode	Normal-White	
Polarizer Mode	Transmissive	
Background Color	White	
Backlight Type	LED	
Backlight Color	White	
Viewing Direction	6 O'clock Direction	

1.3 Outline dimension





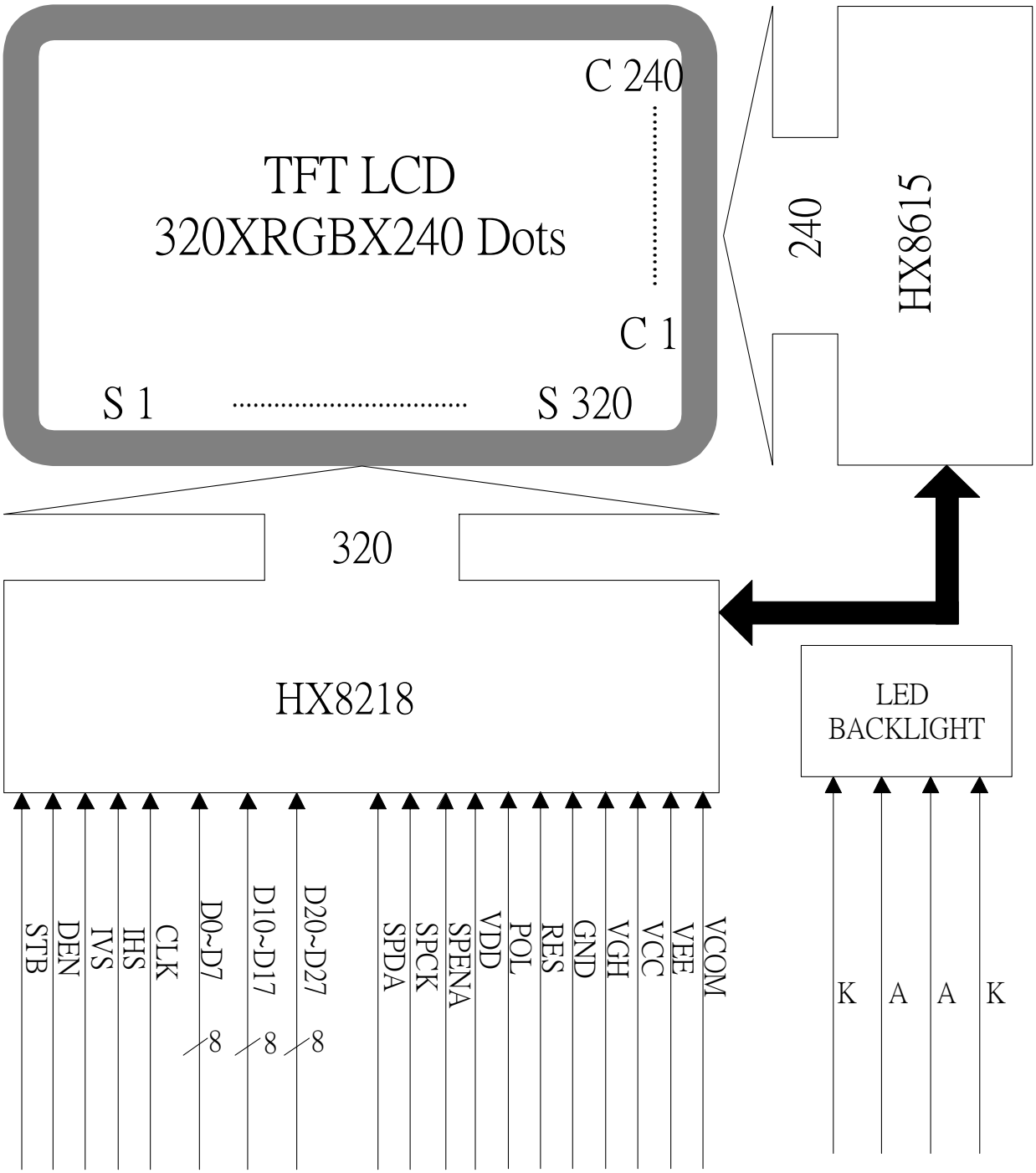
DETAIL "A"



DOTS DETAIL

NOTE :
1.LCD : TFT TRANSMISSIVE TYPE
2.VIEWING DIRECTION : 6 O'CLOCK
3.Top : −20~70°C , Tst : −30~80°C
4.DRIVER IC : SOURCE DRIVER : HX8218−A
GATE DRIVER : HX8615−A
5.LED COLOR : WHITE , 6PCS DICE

1.4 Block diagram:



1-5 Interface Pin Connection:

Pin No.	Pin Symbol	I/O	Description
1	STB	I	Standby mode control. Normally pull high. When STB="L", source driver and DAC are off. All outputs are shorted to VSS. When STB="H", source driver and DAC are on.
2	DEN	I	Input data enable control. Normally pull low.
3	IVS	I	Vertical sync input in digital RGB mode. (Short to GND if not used)
4	IHS	I	Horizontal sync input in digital RGB mode. (Short to GND if not used)
5	CLK	I	Clock signal. Latching data at the rising edge.
6~29	D0~D7 D10~D17 D20~D27	I	D0X, D1X, and D2X indicate R, G, and B data in turn.
30	SPDA	I/O	Serial port Data input/output.
31	SPCK	I	Serial port Clock. Normally pull high.
32	SPENA	I	Serial port Data Enable Signal. Normally pull high.
33	VDD	P	Analog power. 4.5V~5.5V.
34	POL	O	Polarity select for the line inversion control signal. When POL=L, output voltage is negative polarity. When POL=H, output voltage is positive polarity.
35	RES	I	Hardware global reset. Low active. Normally pull high.
36	GND	P	Ground
37	VGH	P	Power supply for LCM drive output High.
38	VCC	P	Digital power. 3V~3.6V.
39	VEE	P	LCD driver negative power supply.
40	VCOM	I	TFT driver signal. Connect to POL through OP. Reference application note.

1	K	P	Backlight LED's cathode.
2	A	P	Backlight LED's anode. +10.4V
3	A	P	Backlight LED's anode. +10.4V
4	K	P	Backlight LED's cathode.

2. ELECTRICAL CHARACTERISTICS

2.1 Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	V_{DD}	-0.3	+7.0	Volt	
Power Supply Voltage	V_{CC}	-0.3	+7.0	Volt	
Power Supply Voltage	V_{GH}	-0.3	+32.0	Volt	
Power Supply Voltage	V_{BB}	-22.0	+0.3	Volt	
LED Forward current	I_{AF}	-	50	mA	
LED Reverse Voltage	V_R	-	11.0	V	
Operate Temperature Range	T_{OPR}	-20	+70	℃	
Storage Temperature Range	T_{STR}	-30	+80	℃	

2.2 DC Characteristics

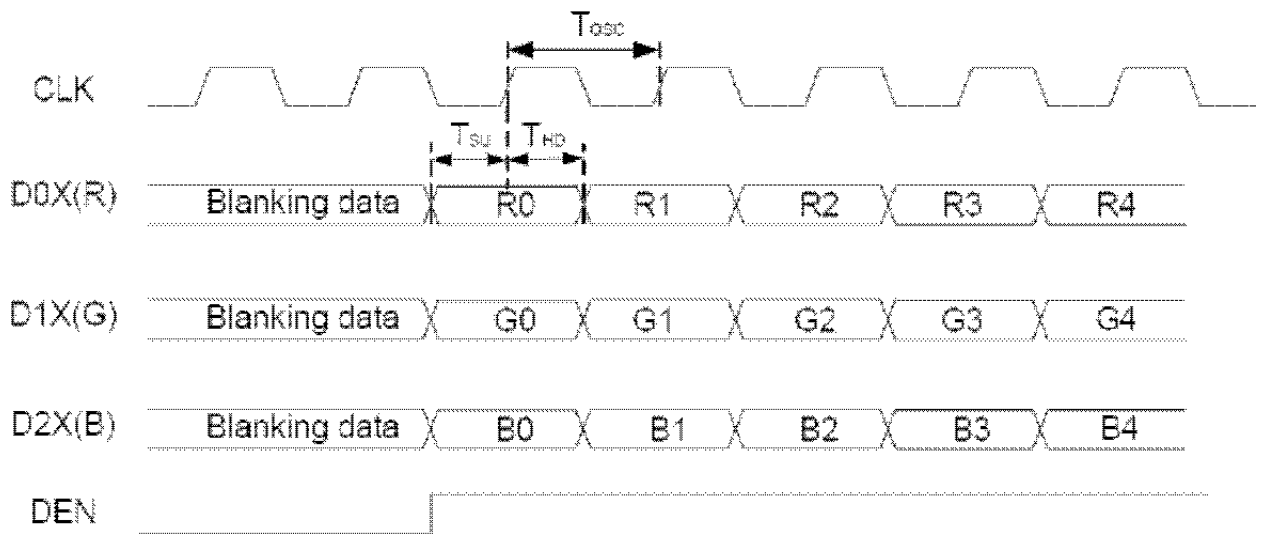
Item	Symbol	Condition	Min.	Typ	Max.	Unit	note
Power Supply for Logic	V_{DD}	-	4.5	5.0	5.5	Volt	
Power Supply for Logic	V_{CC}	-	3	3.3	3.6	Volt	
Input Voltage	V_{IL}	L level	0	-	0.3V_{CC}	Volt	
	V_{IH}	H level	0.7V_{CC}	-	V_{CC}	Volt	
LCM Recommend LCD Module Driving Voltage	V_{GH}	Ta=25℃		+15.0		Volt	
	V_{GL}	Ta=25		-10.0			
Power Supply Current for LCM	I_{DD}	V_{DD}=5.0V	-	10.0	15.0	mA	
	I_{CC}	V_{CC}=3.3V		10.0	15.0		
LED Forward Voltage	V_F	If= 40mA	-	10.4	10.6	Volt	
LED Forward Current	I_F	-	-	40	-	mA	

2.3 AC Characteristics

Digital Parallel RGB interface (960x240 resolution)

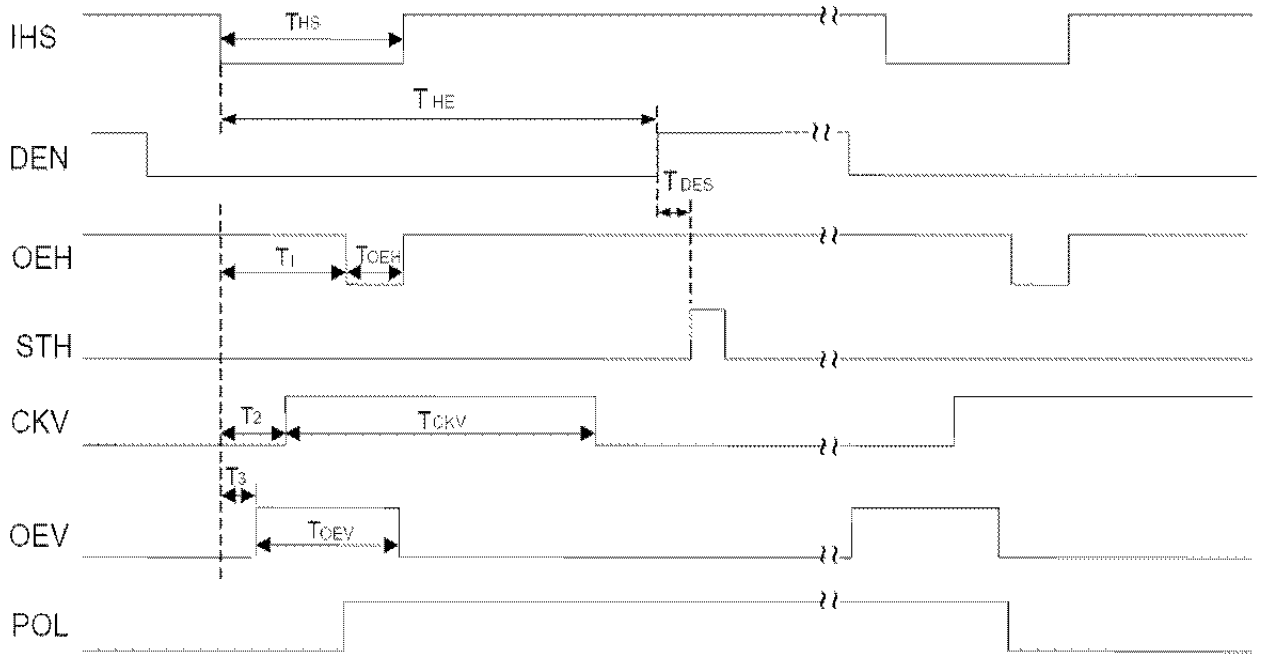
PARAMETER		Symbol	Min.	Typ.	Max.	Unit
CLK period		T_{OSC}	-	156	-	ns
Data setup time		T_{SU}	12	-	-	ns
Data hold time		T_{HD}	12	-	-	ns
IHS period		T_H	-	408	-	T_{OSC}
IHS pulse width		T_{HS}	5	30	-	T_{OSC}
IHS rising time		T_{Cr}	-	-	700	ns
IHS falling time		T_{Cf}	-	-	300	ns
IVS pulse width		T_{VS}	1	3	5	T_H
IVS rising time		T_{Vr}	-	-	700	ns
IVS falling time		T_{Vf}	-	-	1.5	μs
IVS falling to IHS rising time for odd field		T_{HVO}	1	-	-	T_{OSC}
IVS falling to IHS falling time for even field		T_{HVE}	1	-	-	T_{OSC}
IVS-DEN time	NTSC	T_{VSE}	-	18	-	T_H
	PAL	T_{VSE}	-	26	-	T_H
IHS-DEN time		T_{HE}	36	68	88	T_{OSC}
DEN pulse width		T_{EP}	-	320	-	T_{OSC}
DEN-STH time		T_{DES}	-	1	-	T_{OSC}
IVS period	NTSC		-	262.5	-	T_H
	PAL		-	312.5	-	T_H

Digital Parallel RGB

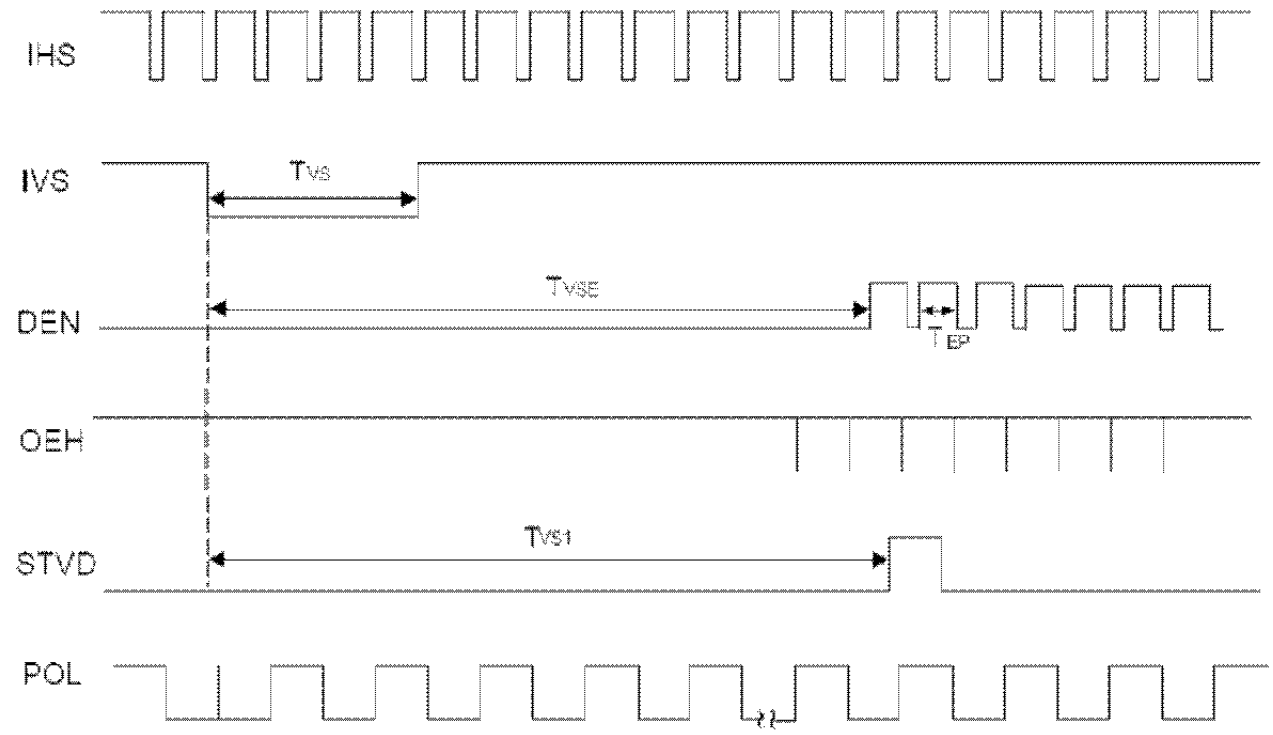


Digital RGB timing waveform

IHS and horizontal control timing waveform



IHS and vertical control timing waveform



3. OPTICAL CHARACTERISTICS

3.1 Characteristics

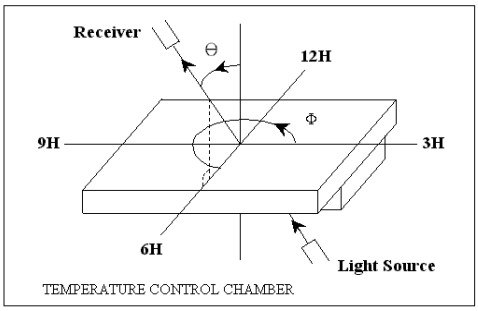
Electrical and Optical Characteristics

No.	Item		symbol / temp.		Min.	Typ.	Max.	Unit	Note
1	Response Time		Tr	25 ℃	-	15	30	ms	2
			Tf	25 ℃	-	35	50		
2	Viewing Angle	Front-Rear	Θ1	Φ = °	35	-	15	degree	3
		Left-Right	Θ2		-45	-	45		
3	Contrast Ratio		Cr	25 ℃	150	200	-	-	4
4	Red x-code		Rx	25 ℃	0.58	0.63	0.68	-	5
	Red y-code		Ry		0.29	0.34	0.39		
	Green x-code		Gx		0.25	0.30	0.35		
	Green y-code		Gy		0.54	0.59	0.64		
	Blue x-code		Bx		0.09	0.14	0.19		
	Blue y-code		By		0.02	0.07	0.12		
	White x-code		Wx		0.26	0.31	0.36		
	White y-code		Wy		0.27	0.32	0.37		
	Brightness		Y		-	165	-	cd/m^2	
5	Brightness Uniformity			25 ℃	80	-	-	%	6

3.2 Definition of optical characteristics

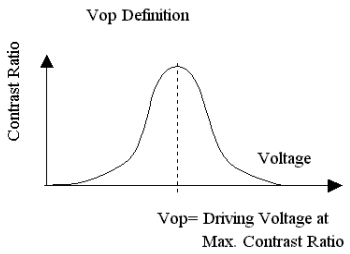
Measurement condition :

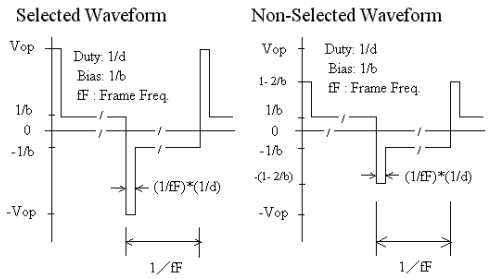
Transmissive and Transflective type



PHOTAL LCD-5000

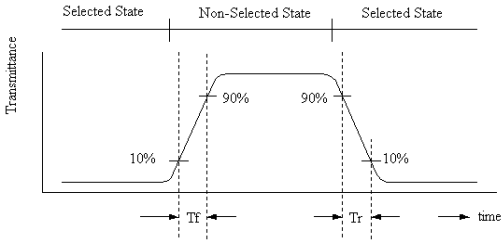
[Note 1] Definition of LCD Driving Vop and Waveform :



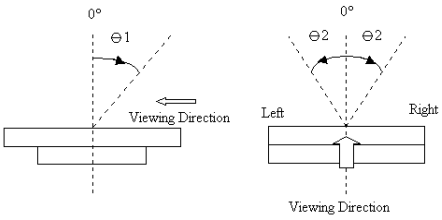


[Note 2] Definition of Response Time

for Positive type :

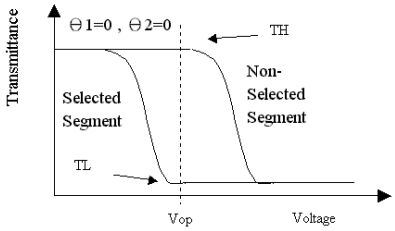


[Note 3] Definition of Viewing Angle :



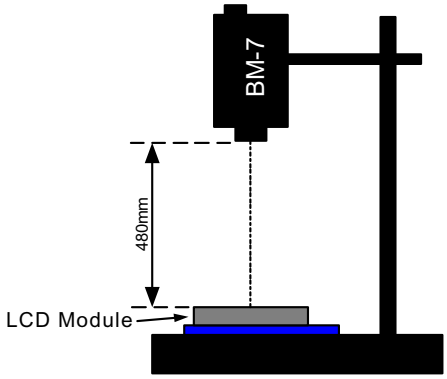
[Note 4] Definition of Contrast Ratio :

for Positive type

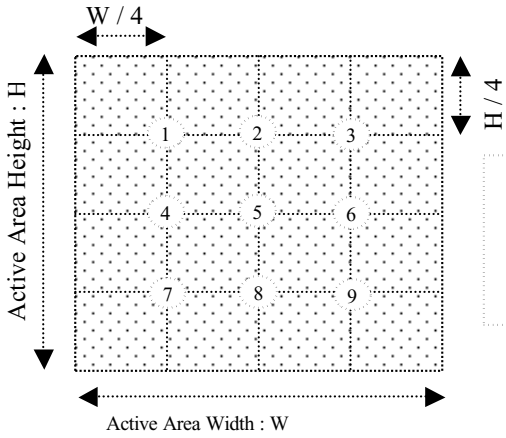


$$\text{Contrast Ratio} = \frac{TH}{TL}$$

[Note 5] Definition of measurement of Color Chromaticity and Brightness

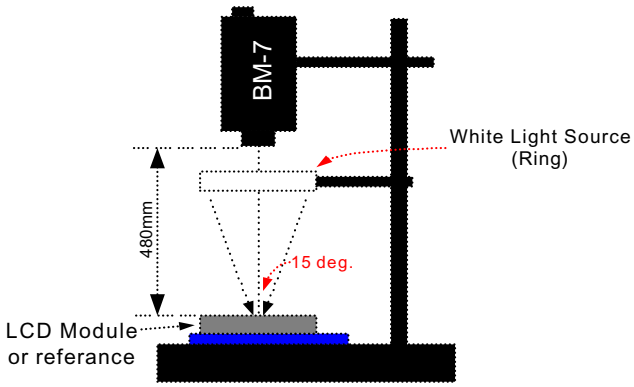


[Note 6] Definition of Brightness Uniformity



$$\text{Brightness Uniformity} = \frac{\text{Minimum Brightness of Point 1~9}}{\text{Maximum Brightness of Point 1~9}}$$

[Note 7] Definition of Measurement of Reflectance



4. RELIABILITY :

Item No	Items	Condition	Remark
1	High temperature operating	70 ℃ , 200 hours	Finish product (With polarizer)
2	Low temperature operating	-20 ℃ , 200 hours	Finish product (With polarizer)
3	High temperature storage	80 ℃ , 200 hours	Finish product (With polarizer)
4	Low temperature storage	-30 ℃ , 200 hours	Finish product (With polarizer)
5	High temperature & humidity storage	60℃, 90%RH, 100 hours	Finish product (With polarizer)
6	Thermal Shock storage	-30℃, 30min.<=> 80℃, 30min. 10 Cycles	Finish product (With polarizer)
7	Vibration test	10 => 55 =>10 => 55 => 10 Hz , within 1 minute Amplitude : 1.5mm. 15 minutes for each Direction (X,Y,Z)	Finish product (With polarizer)
8	Drop test	Packed, 100CM free fall, 6 sides, 1 corner, 3edges	Finish product (With polarizer)
9	Life time	50,000 hours 25℃ , 70%RH below , specification condition driving	Finish product (With polarizer)

* One single product test for only one item.

* Judgment after test : keep in room temperature for more than 2 hours.

- Current consumption < 2 times of initial value
- Contrast > 1/2 initial value
- Function : work normally

5. HANDLING PRECAUTION

☐ PRECAUTION FOR HANDLING LCM

- The LCD module contains a C-MOS LSI. To avoid damage tom the LSI from static electricity generated while working,Ground your body, work/assembly areas and assembly equipment to protect the module against STATIC ELECTRICITY.
- Do not input any signal before power is turned on.
- Do not take LCM from it's packaging bag unit it is assembled.
- Peel off take LCM protective film slowly since static electricity may be generated.
- Pay attention to the humidity of the work shop, 50~60%RH is satisfactory.
- Use a non-leak iron for soldering LCM.
- Do not touch the display surface or connection terminals area with bare hands.Smudges on the display surface reduce the insulation between terminals.
- Cautions for soldering to LCM:
  Condition for soldering I/O terminals:
  Temperature at iron tip :280℃±10℃.
  Soldering time : 3~4sec./ terminals.
  Type of solder : Eutectic solder(rosin flux filled).

☐ PRECAUTION IN USE OF LCD

- Do not contact or scratch the front surface and the contact pads of ac LCD panel with hard. materials such as metal or glass or with one's nail.
- To clean the surface , wipe it gently with soft cloth dampened alcohol.
- Do not attempt to wiped off the contact pads.
- Keep LCD panels away from direct sunlight , also avoid them in high-temperature & high humidity environment for a long period.
- Do not drive LCD panels by DC voltage.
- Do not expose LCD panels to organic solvent.
- Liquid in LCD is hazardous substance , any contacts with liquid crystal materials , wash it off immediately with soap and water.
- The polarizer is easily damaged and should be handle with special care. Don't press or rub it with hard objects.

☐ PRECAUTION FOR STORING LCM

- To avoid degradation of the device , do not store the module under the conditions of direct sunlight , high temperature or high humidity . Keep the module in bags designed to prevent static electricity charging under low temperature / normal humidity conditions(avoid high temperature / high humidity and low temperature below 0℃)

☐ USING ON MEDICAL CARE , SAFETY OR HAZARDOUS APPLICATION OR SYSTEM

- An authorization from URT is required for medical care, safety and hazardous product, application or system . URT will not be responsible of any damage or loss which caused by this products without any authorization given by URT .
- This products is not designed for military appliction.

6. DATE CODE OF PRODUCTS

- Date code will be shown on each product :

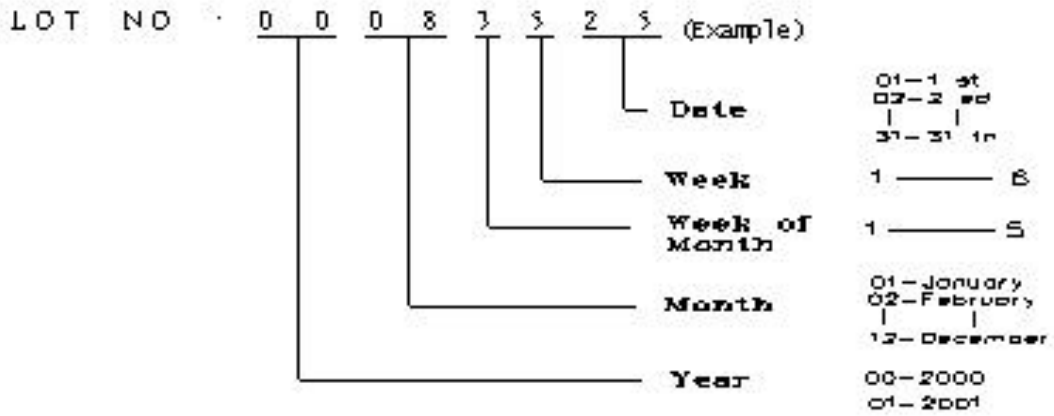
- **Y MM DD - XXX**

  Year Month Day - Production lots

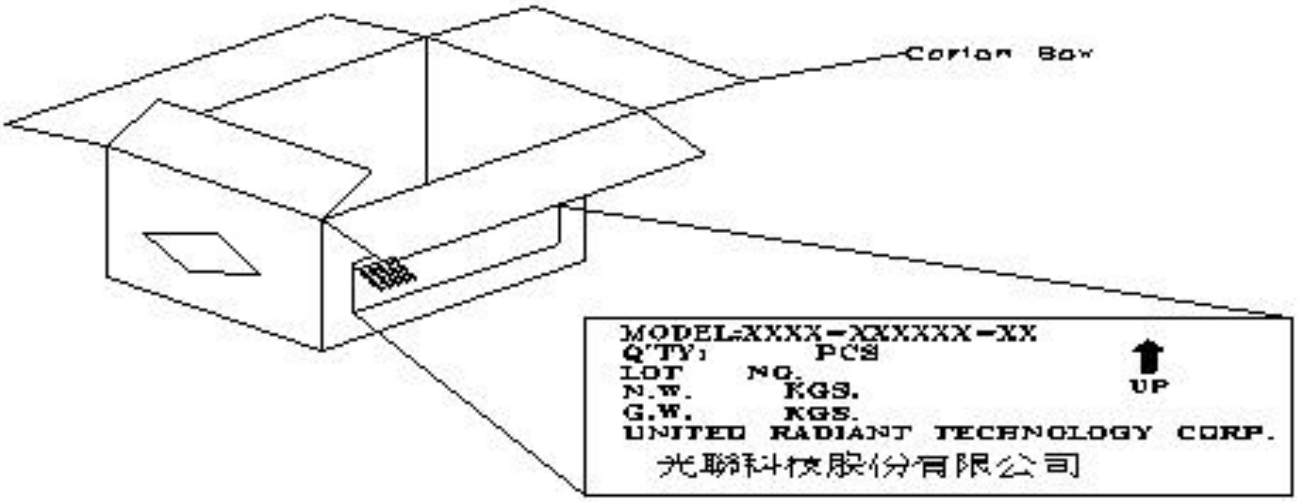
- Example: 2 1 2 2 3 - 0 0 3 ==>Year 2002, Dec.,23rd , Batch no.03

7. PACKING

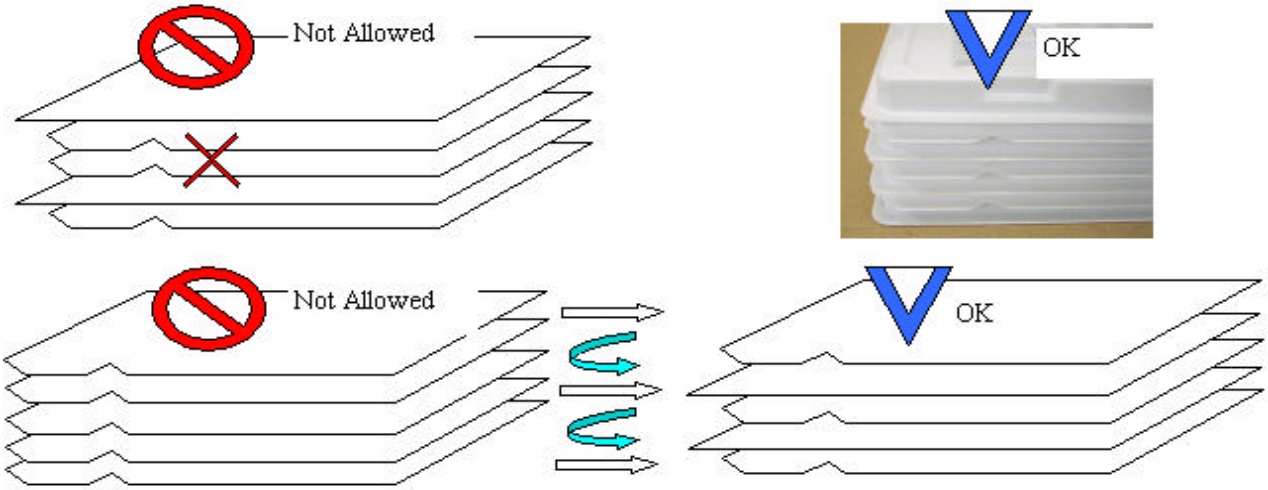
Instruction of lot number:



Lable of carton:



Packing tray must be stacked with alternated direction to each others.
To tacks packing trays in same direction will cause product damaged.



8. INSPECTION STANDARD

8.1. QUALITY :

THE QUALITY OF GOODS SUPPLIED TO PURCHASER SHALL COME UP TO THE FOLLOWING STANDARD.

8.1.1. THE METHOD OF PRESERVING GOODS

AFTER DELIVERY OF GOODS FROM U.R.T. TO PURCHASER. PURCHASER SHALL CONTROL THE LCM AT -10 ℃ ～ 40 ℃ ,AND IT MIGHT BE DESIRABLE TO KEEP AT THE NORMAL ROOM TEMPERATURE AND HUMIDITY UNTIL INCOMING INSPECTION OR THROWING INTO PROCESS LINE.

8.1.2. INCOMING INSPECTION

(A) THE METHOD OF INSPECTION

IF PURCHASER MAKE AN INCOMING INSPECTION , A SAMPLING PLAN SHALL BE APPLIED ON THE CONDITION THAT QUALITY OF ONE DELIVERY SHALL BE REGARDED AS ONE LOT.

(B) THE STANDARD OF QUALITY

ISO-2859-1 (or MIL-STD-105D) , LEVEL Ⅱ SINGLE PLAN.

CLASS	AQL(%)
CRITICAL	0.4 %
MAJOR	0.65 %
MINOR	1.5 %
TOTAL	1.5 %

EVERY ITEM SHALL BE INSPECTED ACCORDING TO THE CLASS.

(C) MEASURE

IF AS THE RESULT OF ABOVE RECEIVING INSPECTION , A LOT OUT IS DISCOVERED. PURCHASER SHALL BE INFORM SELLER OF IT WITHIN SEVEN DAYS. BUT FIRST SHIPMENT WITHIN FOURTEEN DAYS.

8.1.3. WARRANTY POLICY

U.R.T. WILL PROVIDE ONE-YEAR WARRANTY FOR THE PRODUCTS ONLY IF UNDER SPECIFICATION OPERATING CONDITIONS. U.R.T. WILL REPLACE NEW PRODUCTS FOR THESE DEFEAT PRODUCTS WHICH UNDER WARRANTY PERIOD AND BELONG TO THE RESPONSIBILITY OF U.R.T.

8.2. CHECKING CONDITION

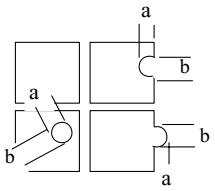
8.2.1. CHECKING DIRECTION SHALL BE IN THE 45 DEGREE AREA TO FACE THE SAMPLE.

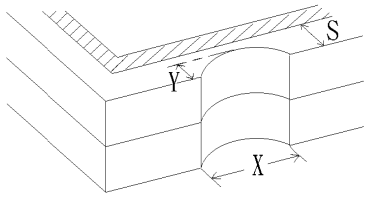
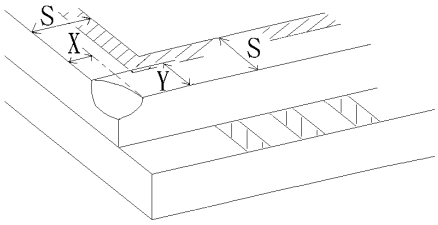
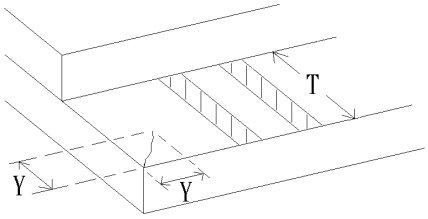
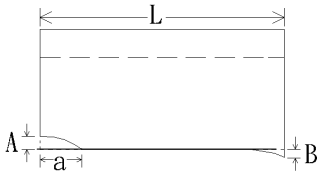
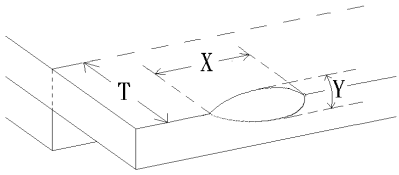
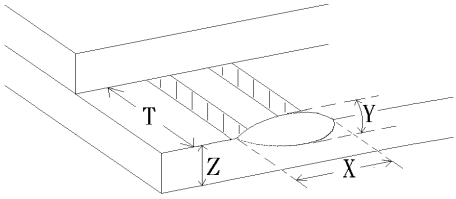
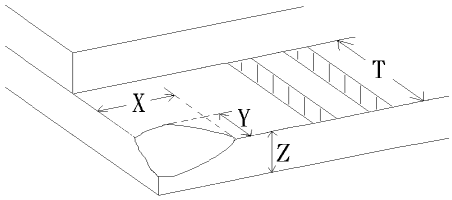
8.2.2. CHECKER SHALL SEE OVER 30 cm. WITH BARE EYES FAR FROM SAMPLE AND USING 2 PCS. OF 20W FLUORESCENT LAMP.

8.3. INSPECTION PLAN :

CLASS	ITEM	JUDGEMENT	CLASS
PACKING & INDICATE	1. OUTSIDE AND INSIDE PACKAGE	"MODEL NO." , "LOT NO." AND "QUANTITY" SHOULD INDICATE ON THE PACKAGE.	Minor
	2. MODEL MIXED AND QUANTITY	OTHER MODEL MIXED.....REJECTED QUANTITY SHORT OR OVER.....REJECTED	Critical
	3. PRODUCT INDICATION	"MODEL NO." SHOULD INDICATE ON THE PRODUCT	Major
ASSEMBLY	4. DIMENSION, LCD GLASS SCRATCH AND SCRIBE DEFECT.	ACCORDING TO SPECIFICATION OR DRAWING.	Major
APPEARANCE	5. VIEWING AREA	POLARIZER EDGE OR LCD'S SEALING LINE IS VISABLE IN THE VIEWING AREA ……..REJECTED	Minor
	6. BLEMISH、BLACK SPOT、WHITE SPOT IN THE LCD AND LCD GLASS CRACKS	ACCORDING TO STANDARD OF VISUAL INSPECTION (INSIDE VIEWING AREA)	Minor
	7. BLEMISH、BLACK SPOT WHITE SPOT AND SCRTCH ON THE POLARIZER	ACCORDING TO STANDARD OF VISUAL INSPECTION (INSIDE VIEWING AREA)	Minor
	8. BUBBLE IN POLARIZER	ACCORDING TO STANDARD OF VISUAL INSPECTION (INSIDE VIEWING AREA)	Minor
	9. LCD'S RAINBOW COLOR	STRONG DEVIATION COLOR (OR NEWTON RING) OF LCD.....REJECTED. OR ACCORDING TO LIMITED SAMPLE (IF NEEDED, AND INSIDE VIEWING AREA)	Minor
ELECTRICAL	10. ELECTRICAL AND OPTICAL CHARACTERISTICS (CONTRAST、VOP、CHROMATICITY … ETC)	ACCORDING TO SPECIFICATION OR DRAWING . (INSIDE VIEWING AREA)	Critical
	11.MISSING PATTERN	MISSING DOT、LINE、CHARACTER ....REJECTED	Critical
	12.SHORT CIRCUIT、WRONG PATTERN DISPLAY	NON DISPLAY、WRONG PATTERN DISPLAY、CURRENT CONSUMPTION OUT OF SPECIFICATION..... REJECTED	Critical
	13. PIN HOLE、PATTERN DEFORMITY	ACCORDING TO STANDARD OF VISUAL INSPECTION	Minor

8.4. STANDARD OF VISUAL INSPECTION

NO.	CLASS	ITEM	JUDGEMENT
8.4.1	MINOR	· BLEMISH、BLACK SPOT、WHITE SPOT IN THE LCD. · BLEMISH、BLACK SPOT、WHITE SPOT AND SCRATCH ON THE POLARIZER	(A) ROUND TYPE: unit : mm. DIAMETER (mm.) / ACCEPTABLE Q'TY Φ ≦ 0.1 / DISREGARD 0.1 < Φ ≦ 0.2 / 2 0.2 < Φ ≦ 0.25 / 1 0.25 < Φ / 0 NOTE: Φ=(LENGTH+WIDTH)/2 (B) LINER TYPE: unit : mm. LENGTH / WIDTH / ACCEPTABLE Q'TY ------ / W ≦0.03 / DISREGARD L ≦ 5.0 / 0.03 < W ≦0.05 / 3 L ≦ 5.0 / 0.05 < W ≦0.07 / 1 ------ / 0.07 < W / FOLLOW ROUND TYPE
8.4.2	MINOR	BUBBLE IN POLARIZER	unit : mm. DIAMETER / ACCEPTABLE Q'TY Φ ≦0.15 / DISREGARD 0.15 < Φ ≦ 0.5 / 2 0.5 < Φ / 0
8.4.3	MINOR	PIN HOLE 、 PATTERN DEFORMITY	 Φ=(a+b)/2 unit : mm. DIAMETER / ACC. Q'TY Φ ≦ 0.1 / DISREGARD 0.1 < Φ ≦ 0.25 / 3 0.25 < Φ / 0

NO.	CLASS	ITEM	JUDGEMENT
8.4.4	MINOR	CRACK	 Y > S REJ.
8.4.5	MINOR	CRACK	 X or Y > S REJ.
8.4.6	MAJOR	GLASS SCRATCH	 Y > (1/2) T REJ.
8.4.7	MAJOR	SCRIBE DEFECT	 1. a> L/3 , A>1.5mm. REJ. 2. B : ACCORDING TO DIMENSION
8.4.8	MINOR	CRACK (ON THE TERMINAL AREA)	 Φ= (x+y)/2 > 2.5 mm REJ.
8.4.9	MINOR	CRACK (ON THE TERMINAL SURFACE)	 Y > (1/3) T REJ.
8.4.10	MINOR	CRACK	 Y > T REJ.