CONFIDENTIAL(B)

SPECIFICATION

OF

LIQUID CRYSTAL DISPLAY MODULE

UNITED RADIANT TECHNOLOGY CORP. 光聯科技 Dec-13-2024 品管部 QC DEPT.

CUSTOMER : URT-STD

Model No. : UMSH-8366MD-4T

Model version : 0

Document Revision : 4

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 CORPORATION

Joe Wu	Ashin Chiu	Jenny Wang	Dec-13-2024
APPROVED	CHECKED	PREPARED	Date

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Revision record

Document Revision	Model No. Version No.	Description	Revision by
0	UMSH-8366MD-T Version No. 0	3.5”TFT.	Ken Lin Jeffry Chen 30-Sep-2009
1	UMSH-8366MD-T Version No. 1	Modify the Back-light only Specification.	Jenny Huang Jeffry Chen 28-Jul-2012
2	UMSH-8366MD-T Version No. 2	Modify the packing mode.	Design Section 05-Dec-2018
3	UMSH-8366MD-T(REV1) Version No. 0	1.Chang PLZ. 2.Modify the module number from UMSH-8366MD-T to UMSH-8366MD(REV1).	William Don Eric Wang 24-May-2024
4	UMSH-8366MD-4T Version No. 0	1. Chang LCD & Modify Optical Characteristics 2. Mmodify the module number From UMSH-8366MD-T(REV1) to UMSH-8366MD-4T.	William Don Eric Wang 13-Dec-2024

CONTENTS:

1. BASIC SPECIFICATION

1.1 Mechanical specifications

Items	Nominal Dimension	Unit
Active screen size	3.5” diagonal	-
Dot Matrix	320 * RGB *240	Pixel
Module Size (W x H x T)	76.9 x 63.9 x 3.955	mm.
Active Area (W x H)	70.08 x 52.56	mm.
Dot Pitch (W x H)	0.219 x 0.219	mm.
Color depth	262K	color
Interface	8-bits serial/24-bits parallel RGB / CCIR601/656	-
Driving IC Package	COG	-
Module Weight	35±10%	g

* The maximum color depth of this driver IC is 262K colors ,not 16.7M.

1.2 Display specification

Display	Descriptions	Note
LCD Type	a-Si TFT	-
LCD Mode	TN / Normal white	-
Polarizer Mode	Transmissive	-
Polarizer Surface	Normal	-
Pixel arrangement	RGB-stripe	
Backlight Type	LED	-
Viewing Direction (Gray inversion)	6 O'clock Direction	-

Color tone is slightly changed by temperature and driving voltage.
Note 1 : The viewing direction defined in this specification is according to the rubbing direction of its TFT surface treatment by the TFT glass manufacturer. The grayscale inversion is at this direction as well. However, the optimal viewing direction for human view is normally where the color does NOT change to grayscale inversion, and this would be the opposite site of the specified viewing direction in this specification. In any case we advise customers to judge by themselves, and be aware of this phenomenon.

1.3 Outline dimension

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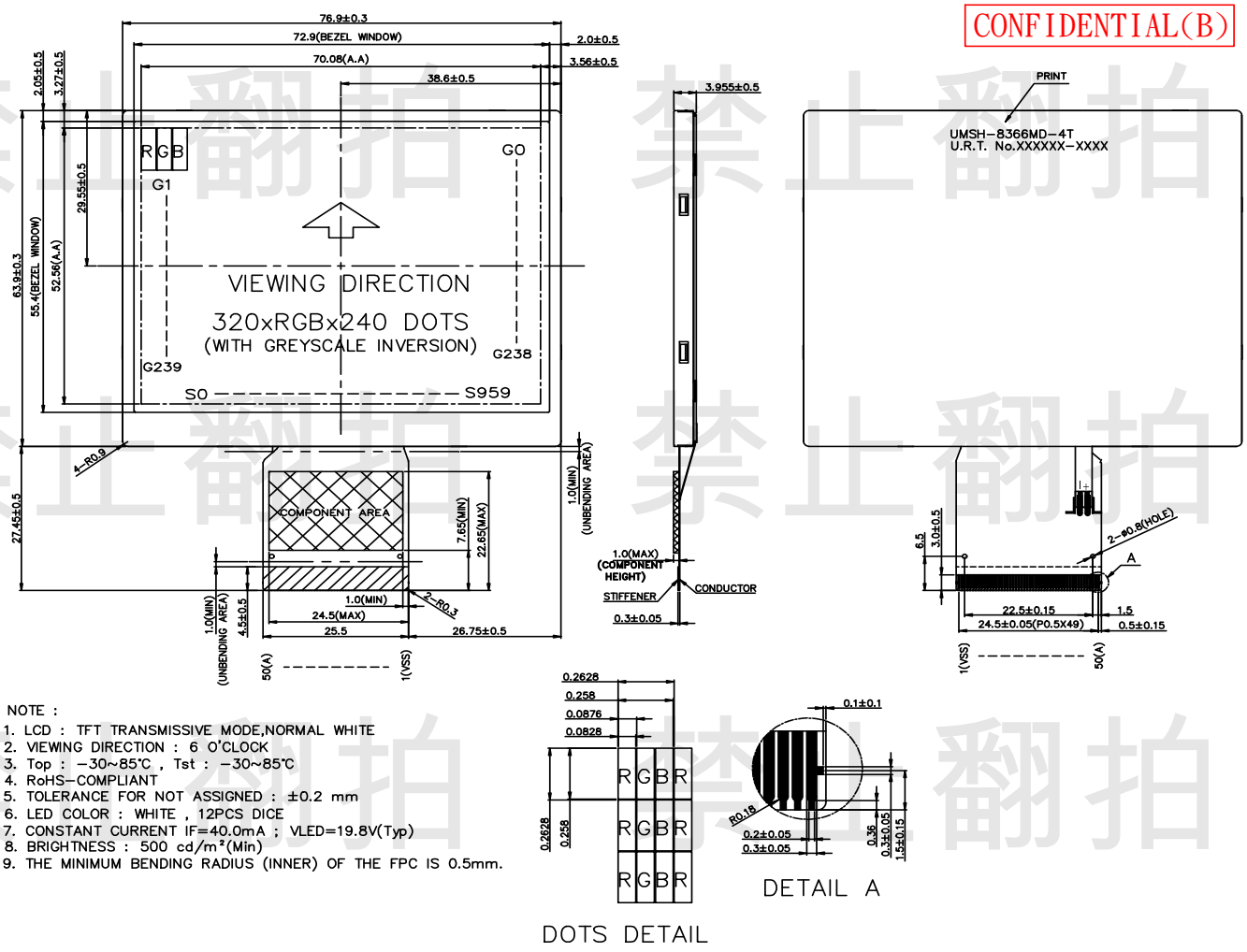
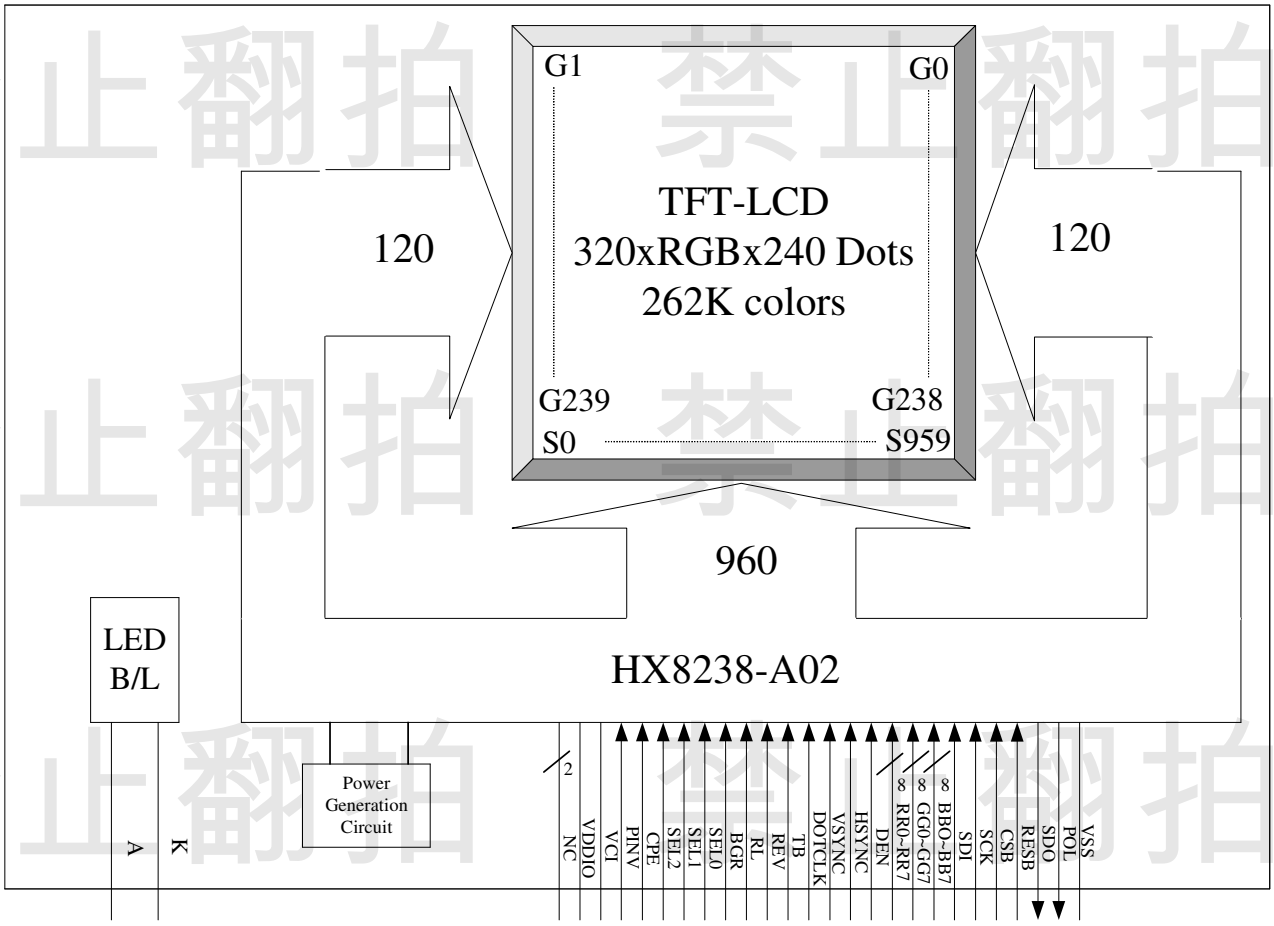


NOTE :
1. LCD : TFT TRANSMISSIVE MODE,NORMAL WHITE
2. VIEWING DIRECTION : 6 O'CLOCK
3. Top : −30~85℃ , Tst : −30~85℃
4. RoHS−COMPLIANT
5. TOLERANCE FOR NOT ASSIGNED : ±0.2 mm
6. LED COLOR : WHITE , 12PCS DICE
7. CONSTANT CURRENT IF=40.0mA ; VLED=19.8V(Typ)
8. BRIGHTNESS : 500 cd/m²(Min)
9. THE MINIMUM BENDING RADIUS (INNER) OF THE FPC IS 0.5mm.

DOTS DETAIL

DETAIL A

1.4 Block diagram:



1.5 Interface pin :

Pin No.	Pin Name	I/O	Description
1	VSS	P	System ground pin of the IC. - Connect to system ground
2	POL	O	Polarity signal to monitor VCOM signal. - Leave it OPEN.
3	SDO	O	Data output pin in serial mode. - Leave it OPEN when not used
4	RESB	I	System reset pin. Internal pull high.
5	CSB	I	Chip select pin of serial interface. Internal pull high. - Leave it OPEN when not used.
6	SCK	I	Clock pin of serial interface. Internal pull high. - Leave it OPEN when not used
7	SDI	I	Data input pin in serial mode. Internal pull high. - Leave it OPEN when not used
8~31	BB [0:7] GG [0:7] RR [0:7]	I	Graphic Data Input Pins. Internal pull low. - RR [0:7]: Red Data - 8-bits - GG [0:7]: Green Data - 8-bits - BB [0:7]: Blue Data - 8-bits For 8 bit interface, only RR[0:7] are used. For unused pins, please connect to VSS or floating.
32	DEN	I	Display enable pin from controller. Connect to VDDIO or floating if not used.
33	HSYNC	I	Line synchronization signal. Internal pull high. - Fixed to VDDIO or floating if not used
34	VSYNC	I	Frame synchronization signal. Internal pull high. - Fixed to VDDIO or floating if not used.
35	DOTCLK	I	Dot-clock signal and oscillator source.

<table>
<tr><th>Pin No.</th><th>Pin Name</th><th>I/O</th><th>Description</th></tr>
<tr><td>36</td><td>TB</td><td>I</td><td>Input pin to select the Gate driver scan direction.
- Connect to VSS for Gate scan from G239 to G0 (reverse scan)
- Connect to VDDIO for Gate scan from G0 to G239 (normal scan)</td></tr>
<tr><td>37</td><td>REV</td><td>I</td><td>Input pin to select the display reversion.
- Connect to VDDIO mapping data ‘0’ to maximum pixel voltage for normally white panel
- Connect to VSS for mapping data ‘0’ to minimum pixel voltage for normally black panel</td></tr>
<tr><td>38</td><td>RL</td><td>I</td><td>Input pin to select the Source driver data shift direction.
- Connect to VDDIO for display first RGB data at S0-S2.
- Connect to VSS for display first RGB data at S959-S957.</td></tr>
<tr><td>39</td><td>BGR</td><td>I</td><td>Input pin to select the color mapping.
- Connect to VDDIO for Blue-Green-Red mapping.
- Connect to VSS for Red-Green-Blue mapping.</td></tr>
<tr><td>40~42</td><td>SEL0~2</td><td>I</td><td>Input pin to select input interface mode.
<table>
<tr><th>SEL2</th><th>SEL1</th><th>SEL0</th><th>Format</th><th>Operating Frequency</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>Parallel-RGB data format (only support stripe type color filter)</td><td>7.5MHz</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>Serial-RGB data format</td><td>19.5MHz</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>CCIR 656 data format (640RGB)</td><td>24.54MHz</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>CCIR 656 data format (720RGB)</td><td>27MHz</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>YUV mode A data format (Cr-Y-Cb-Y)</td><td>24.54MHz</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>YUV mode A data format (Cr-Y-Cb-Y)</td><td>27MHz</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>YUV mode B data format (Cb-Y-Cr-Y)</td><td>27MHz</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>YUV mode B data format (Cb-Y-Cr-Y)</td><td>24.54MHz</td></tr>
</table>
</td></tr>
</table>

Pin No.	Pin Name	I/O	Description
43	CPE	I	Input pin to enable internal charge pump circuit. Internal pull high. - Connect to VDDIO to enable internal charge pump. - Connect to VSS to disable internal charge pump
44	PINV	I	Control the polarity of POL signal. Internal pull low. - Connect to VDDIO, POL phase is reversed with internal VCOM signal. - Connect to VSS, POL phase is same with internal VCOM signal.
45	VCI	P	Power Supply for Analog Circuits.
46	VDDIO	P	Voltage input pin for I/O logic.
47	NC	-	No connection.
48	NC	-	No connection.
49	K	P	Backlight LED's cathode.
50	A	P	Backlight LED's anode.

2. ELECTRICAL CHARACTERISTICS

2.1 Absolute Maximum Ratings

Items	Symbol	Min.	Max.	Unit
Input voltage	VCI	VSS-0.3	5.0	V
Supply Voltage	VDDIO	VSS-0.3	4.0	V
Operate temperature range	TOP	-30	85	℃
Storage temperature range	TST	-30	85	℃

2.2 DC Characteristics

Items	Symbol	Min.	Typ.	Max.	Unit	Condition
Power supply voltage	VCI	2.5	3.3	3.6	V	
Power supply pin of IO pins	VDDIO	1.4	3.3	3.6	V	
Current consumption	$I_{VCI}+I_{VDDIO}$	-	-	16	mA	NOTE
Dot Clock	DCK	-	7.5	10	MHz	
Serial Clock	XSCK	-	19.5	30	MHz	

NOTE : The method to illuminate the LCD panel is using the 2-4-7commend under the measuring condition.

Measuring Condition :

Standard Value MAX.

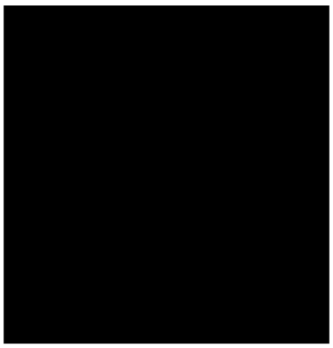
Ta = 25℃

V_{CI} = 3.3V

VDDIO = 3.3V

Dot Clock = 7.5MHz

Display Patten



0 gray black pattern

2.3 Back-light only Specification

Parameter	Symbol	Min	Typ	Max	Unit	Test Condition	Note
Supply Current	If	-	40	-	mA	Ta=25℃	-
Supply Voltage	VF	16.2	19.8	21.6	V	Ta=25℃	-
Half-Life Time	Lf	-	30000	-	hrs	Ta=25℃	-

Note: The "Half-Life Time" is defined as the LED chip brightness decreases to 50% than original brightness, Based on Ta 25±2℃,60±10% RH condition.

2.4 AC Characteristics

2.4.1 8-bits serial/24-bits parallel RGB

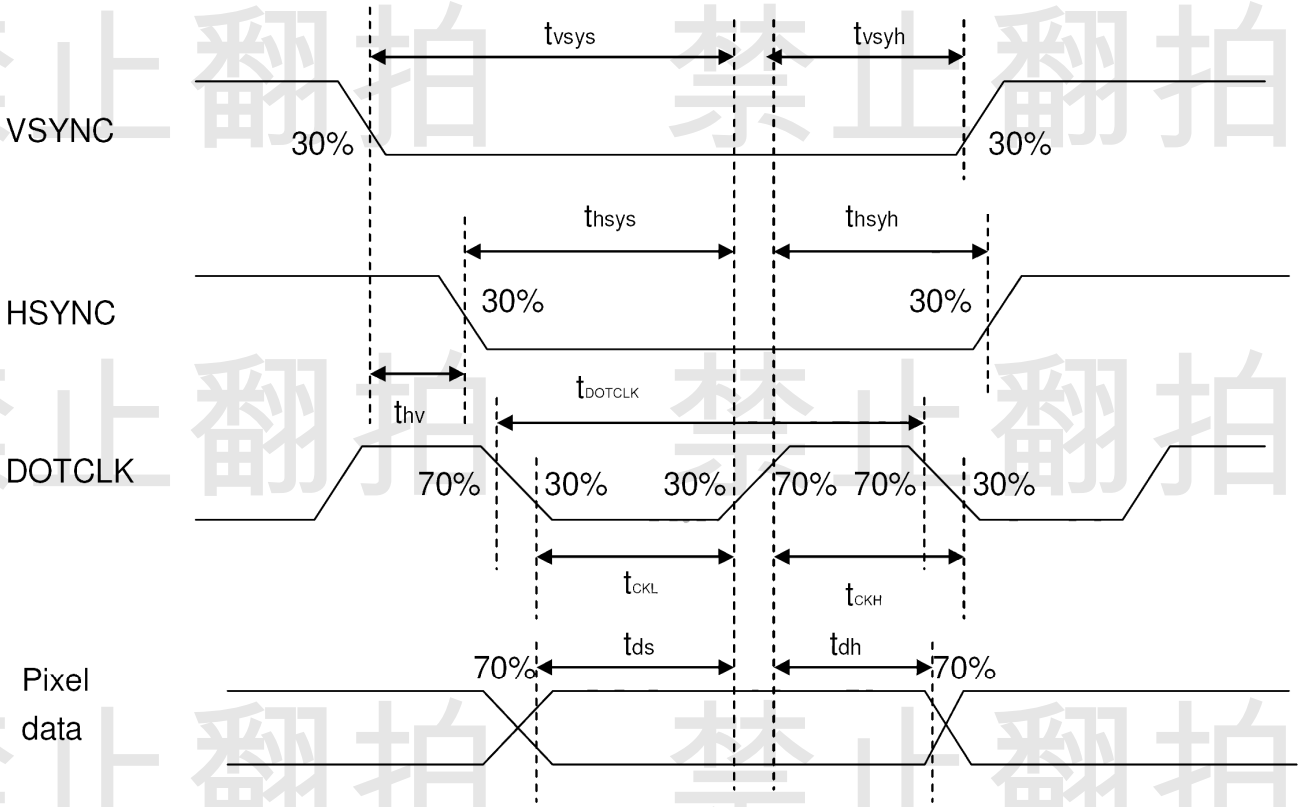


Figure 13. 1Pixel Timing

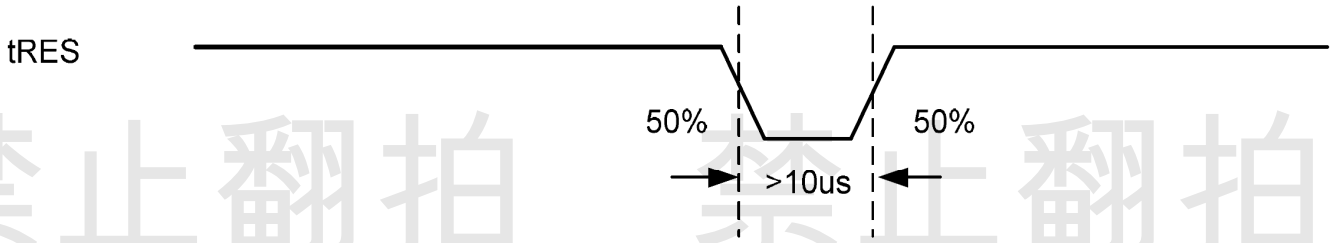


Figure 13. 2 tRES Timing

Characteristics	Symbol	Min.		Typ.		Max.		Unit
		24bit	8bit	24bit	8bit	24bit	8bit	
DOTCLK Frequency	fDOTCLK	-		7.5	19.5	10	30	MHz
DOTCLK Period	tDOTCLK	100	33.3	133	51.3	-	-	ns
Vertical Sync Setup Time	tvsys	20	10	-	-	-	-	ns
Vertical Sync Hold Time	tvsyh	20	10	-	-	-	-	ns
Horizontal Sync Setup Time	thsys	20	10	-	-	-	-	ns
Horizontal Sync Hold Time	thsyh	20	10	-	-	-	-	ns
Phase difference of Sync Signal Falling Edge	thv	1		-		240		tDOTCLK
DOTCLK Low Period	tCKL	50	15	-	-	-	-	ns
DOTCLK High Period	tCKH	50	15	-	-	-	-	ns
Data Setup Time	tds	12	8	-	-	-	-	ns
Data hold Time	tdh	12	8	-	-	-	-	ns
Reset pulse width	tRES	10		-		-		us

Note: External clock source must be provided to DOTCLK pin of HX8238-A. The driver will not operate if absent of the clocking signal.

Table 13. 1 Pixel & tRES Timing

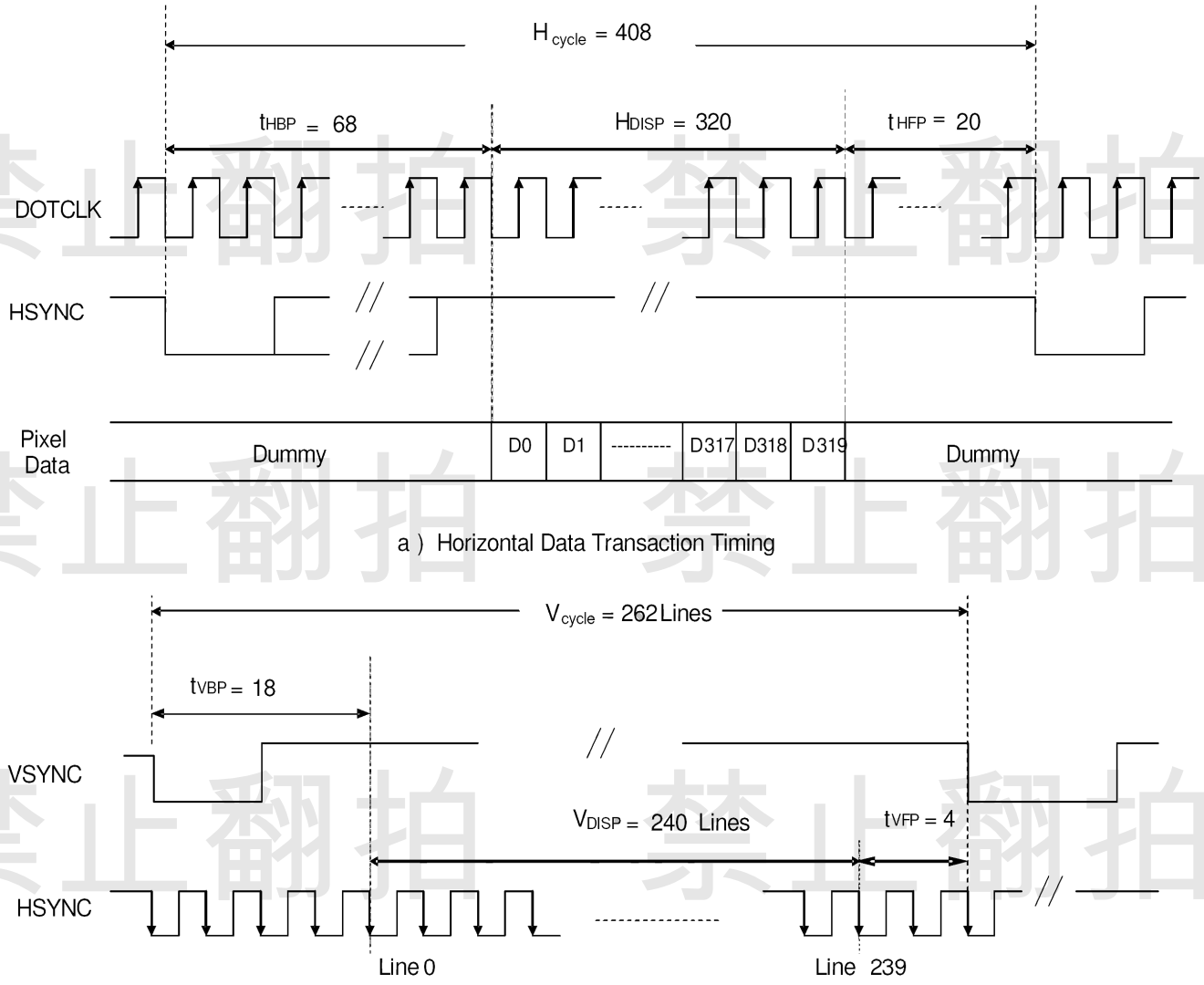


Figure 13. 3 Data Transaction Timing in Parallel RGB (24 bit) Interface (SYNC Mode)

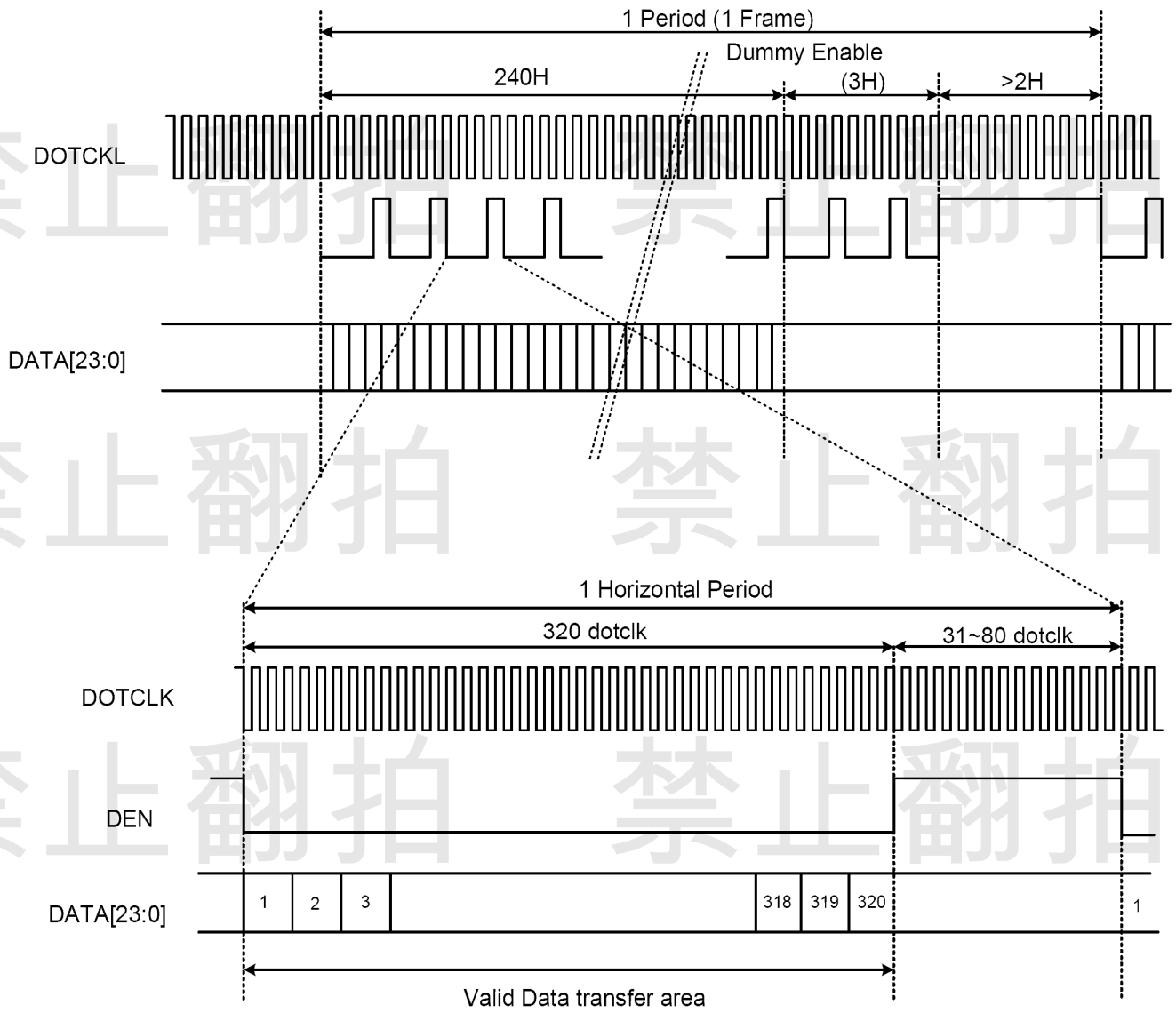


Figure 13. 4 Data Transaction Timing in Parallel RGB (24 bit) Interface (DE Mode)

Characteristics		Symbol	Min		Typ		Max		Unit
			24bit	8 bit	24bit	8 bit	24bit	8 bit	
DOTCLK Frequency		fDOTCLK	-	-	7.5	19.5	10	30	MHz
DOTCLK Period		tDOTCLK	100	33.3	133	51.3	-	-	ns
Horizontal Frequency (Line)		fH	-		18.37		22.35		KHz
Vertical Frequency (Refresh)		fV	-		70		90		Hz
Horizontal Back Porch		tHBP	-	-	68	204	-	-	tDOTCLK
Horizontal Front Porch		tHFP	-	-	20	60	-	-	tDOTCLK
Horizontal Data Start Point		tHBP	-	-	68	204	-	-	tDOTCLK
Horizontal Blanking Period		tHBP + tHFP	-	-	88	264	-	-	tDOTCLK
Horizontal Display Area		HDISP	-	-	320	960	-	-	tDOTCLK
Horizontal Cycle		Hcycle	-	-	408	1224	450	1350	tDOTCLK
Vertical Back Porch		tVBP	-		18		-		Lines
Vertical Front Porch		tVFP	-		4		-		Lines
Vertical Data Start Point		tVBP	-		18		-		Lines
Vertical Blanking Period		tVBP + tVFP	-		22		-		Lines
Vertical Display Area	NTSC	VDISP	-		240		-		Lines
	PAL				280(PALM=0)				
					288(PALM=1)				
Vertical Cycle	NTSC	Vcycle	-		262		350		Lines
	PAL				313				

Table 13. 2 Data Transaction Timing in Normal Operating Mode

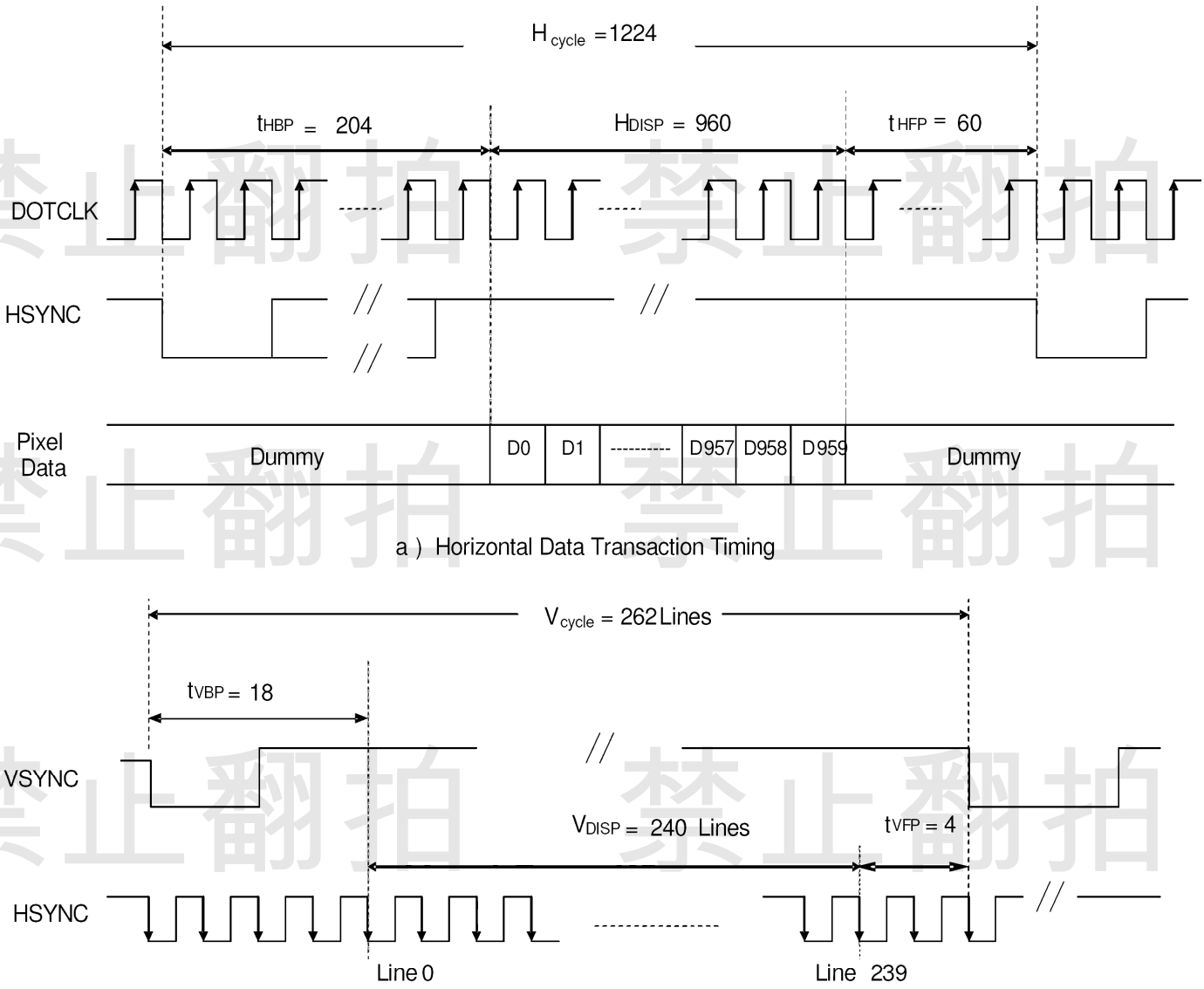


Figure13. 1

Figure 13. 5 Data Transaction Timing in Serial RGB (8 bit) Interface (SYNC Mode)

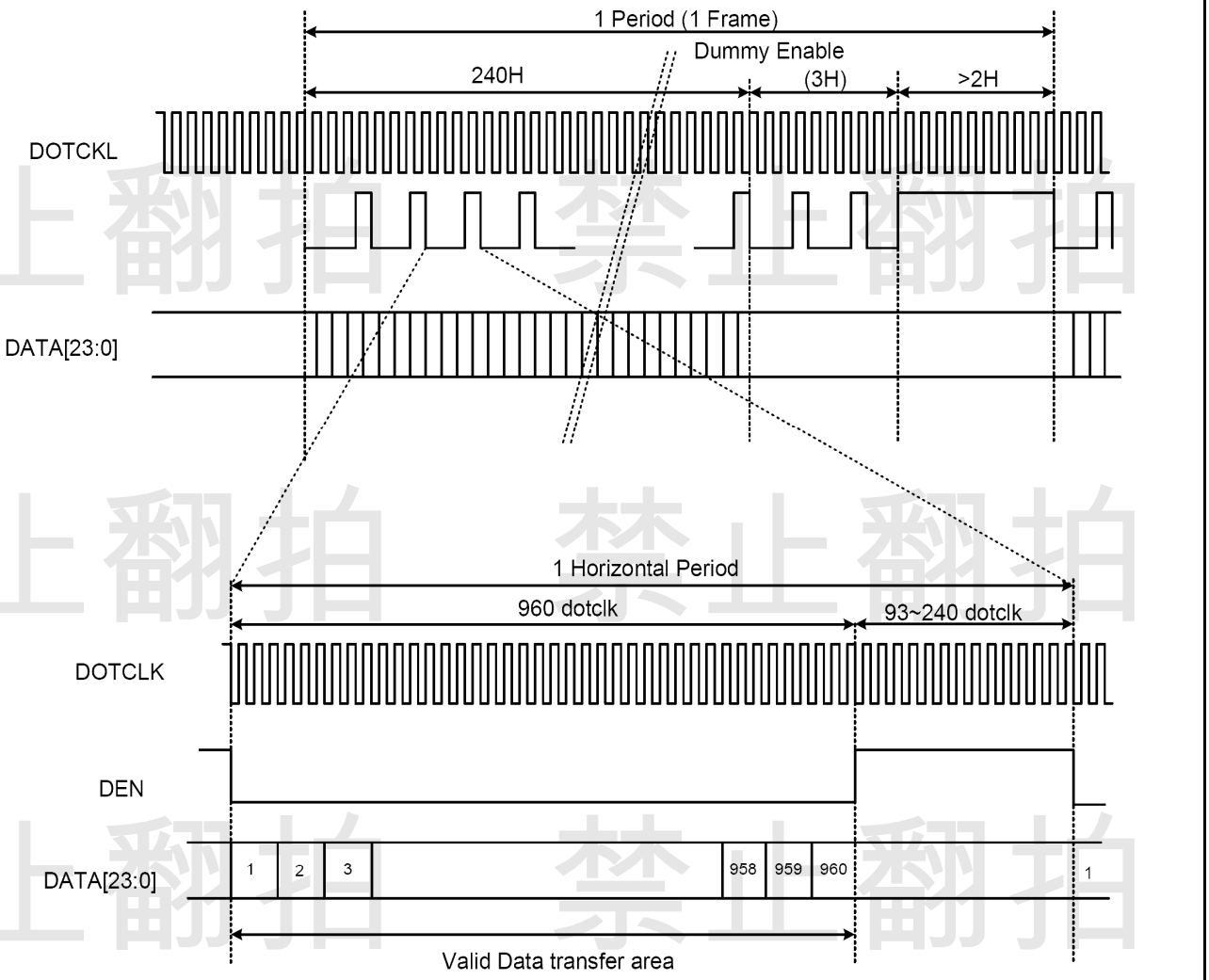
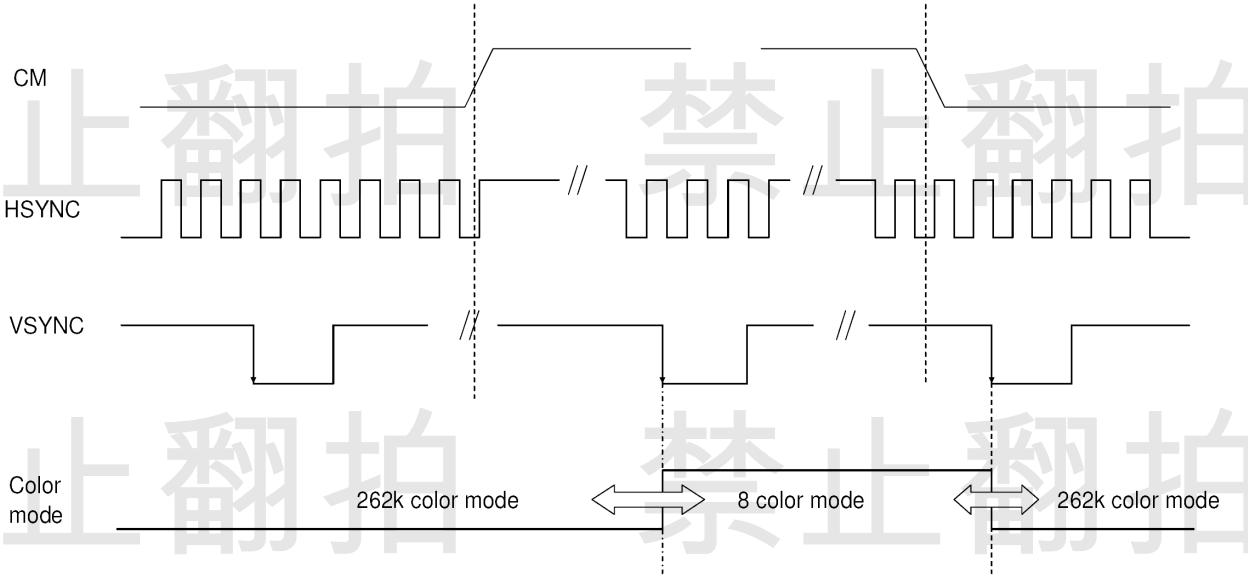


Figure 13. 6 Data Transaction Timing in Serial RGB (8 bit) Interface (DE Mode)



Note: The color mode conversion starts at the first falling edge of VSYNC after stage change of CM.

Figure 13. 7 Color Mode Conversion Timing

2.4.2 CCIR601 Timing

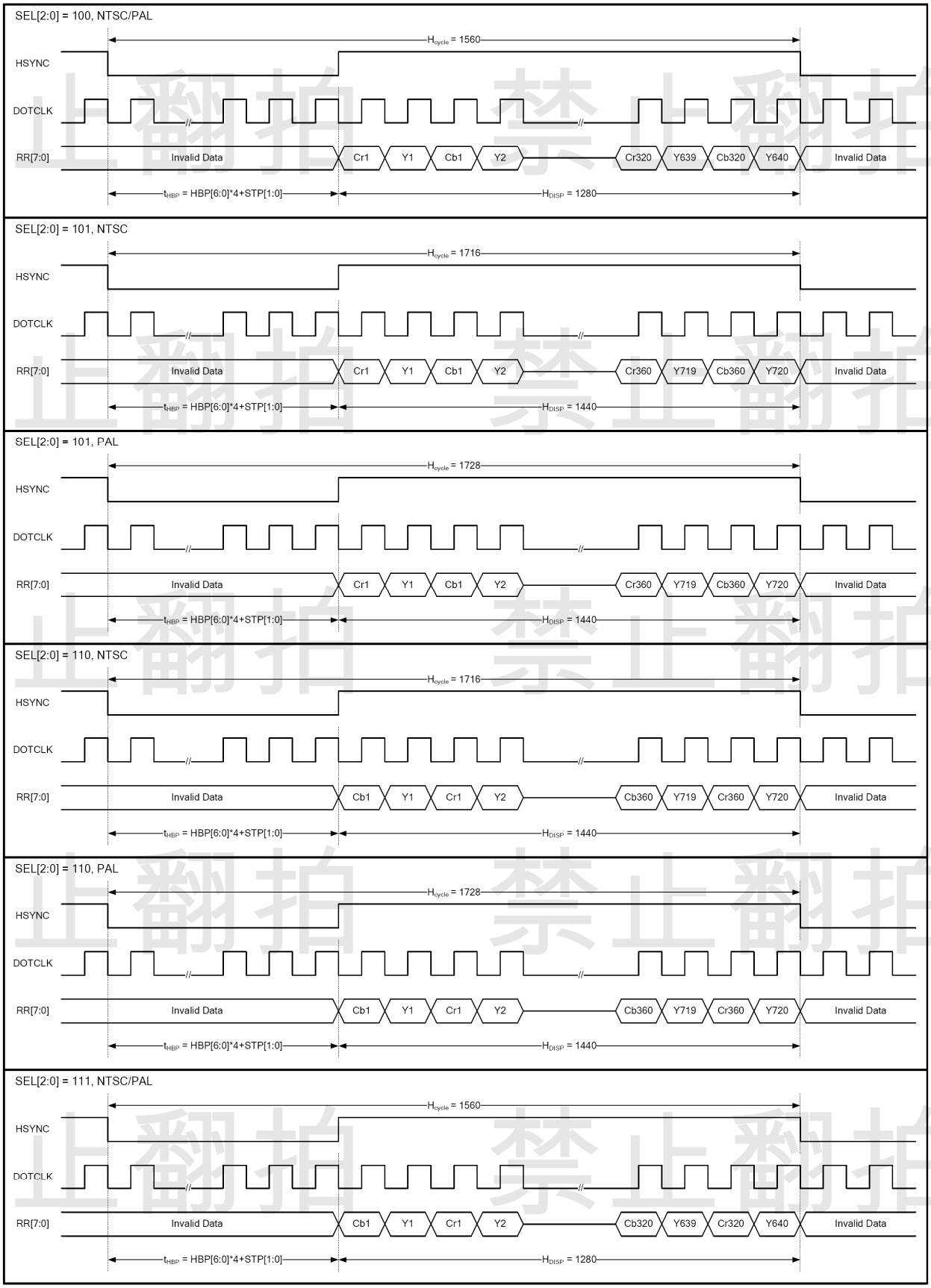


Figure 13. 9 CCIR601 Horizontal Timing

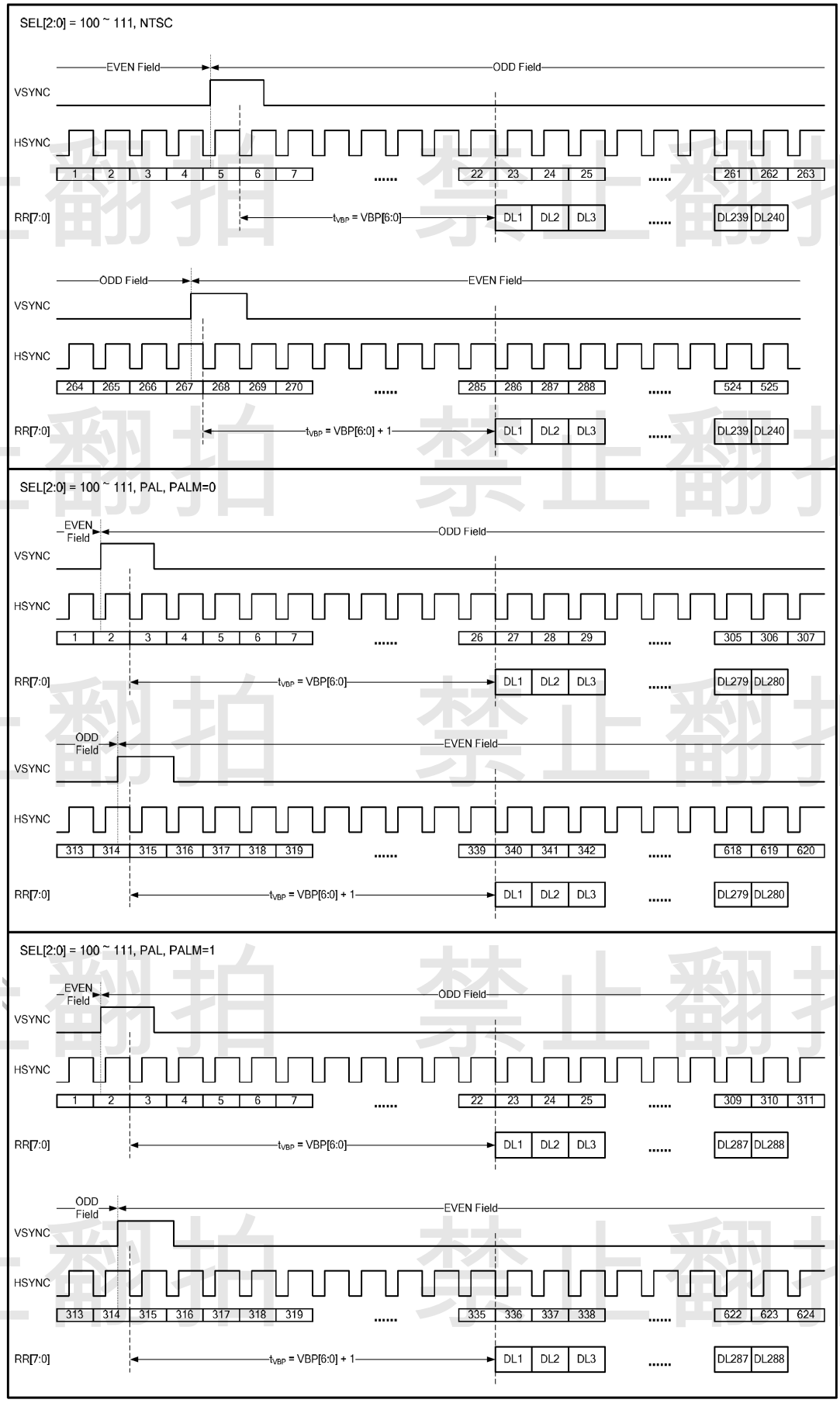


Figure 13. 10 CCIR601 Vertical Timing

2.4.3 CCIR656 Timing

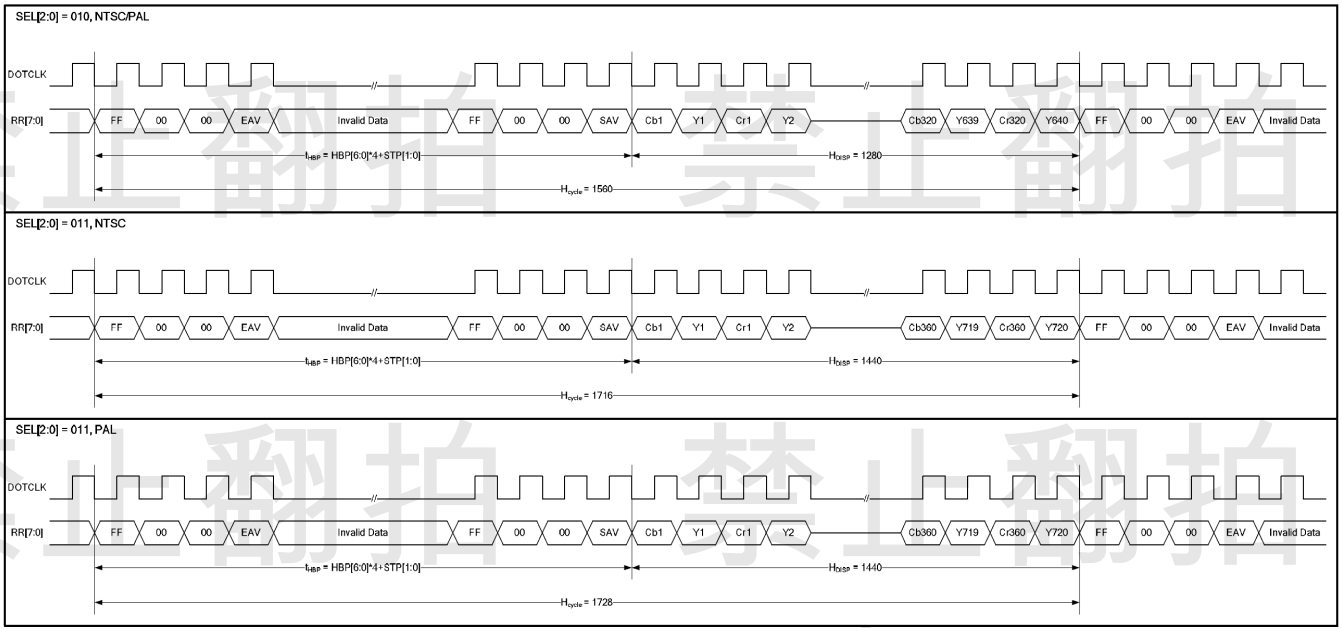


Figure 13. 11 CCIR656 Horizontal Timing

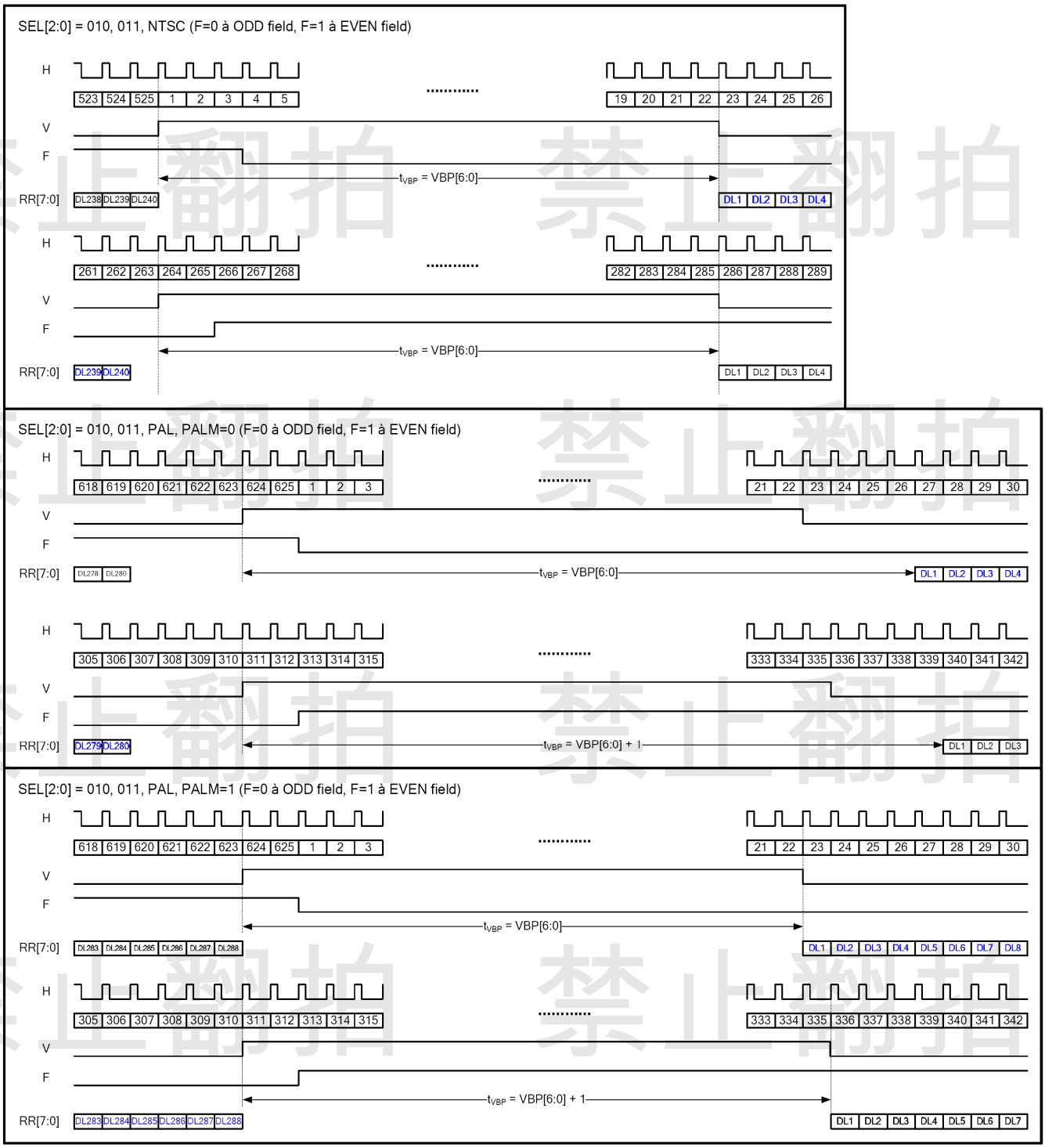
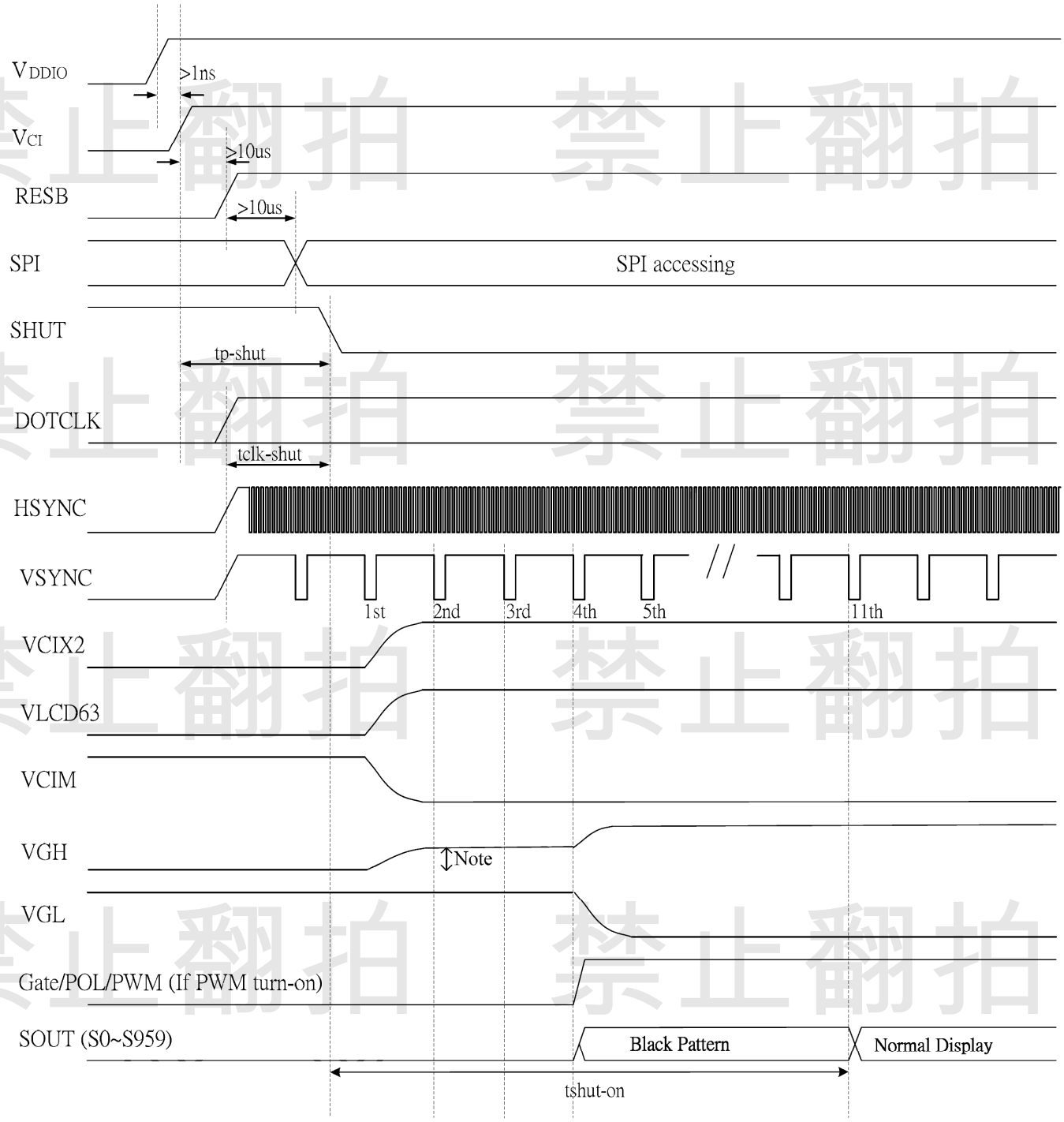


Figure 13. 12 CCIR656 Vertical Timing

2.4.4 Power Up Sequence



Note: There is a diode between VCIX2 and VGH. Switch on VCIX2 will move VGH up.

Figure 13. 13 Power Up Sequence with SHUT

Characteristics	Symbol	Min	Typ	Max	Units
VCI / VDDIO on to falling edge of SHUT	tp-shut	1	-	-	us
DOTCLK	tclk-shut (Note1)	1	-	-	clk
Falling edge of SHUT to display start -1 line: 408 clk -1 frame: 262 line -DOTCLK = 7.5MHz	tshut-on (Note2)	-	-	11	frame

Table 13. 3 Power Up Sequence

Note1: It is necessary to input DOTCLK before the falling edge of SHUT.

Note2: Display starts at 11th falling edge of VSTNC after the falling edge of SHUT. The display starts at the falling edge of VSYNC which is determined by BLT[1:0] of R04h.

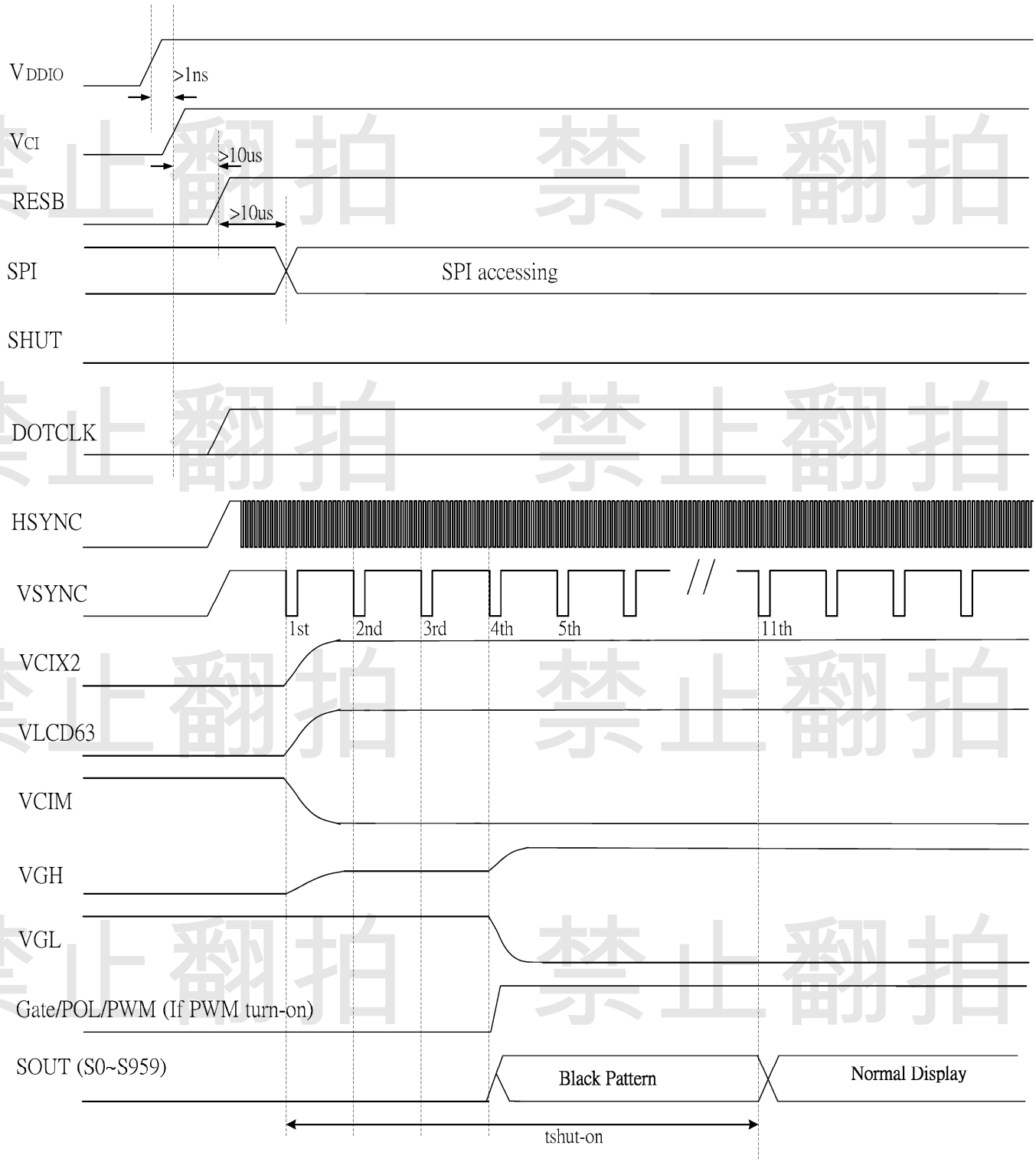


Figure 13. 14 Power Up Sequence without SHUT

2.4.5 Power Down Sequence

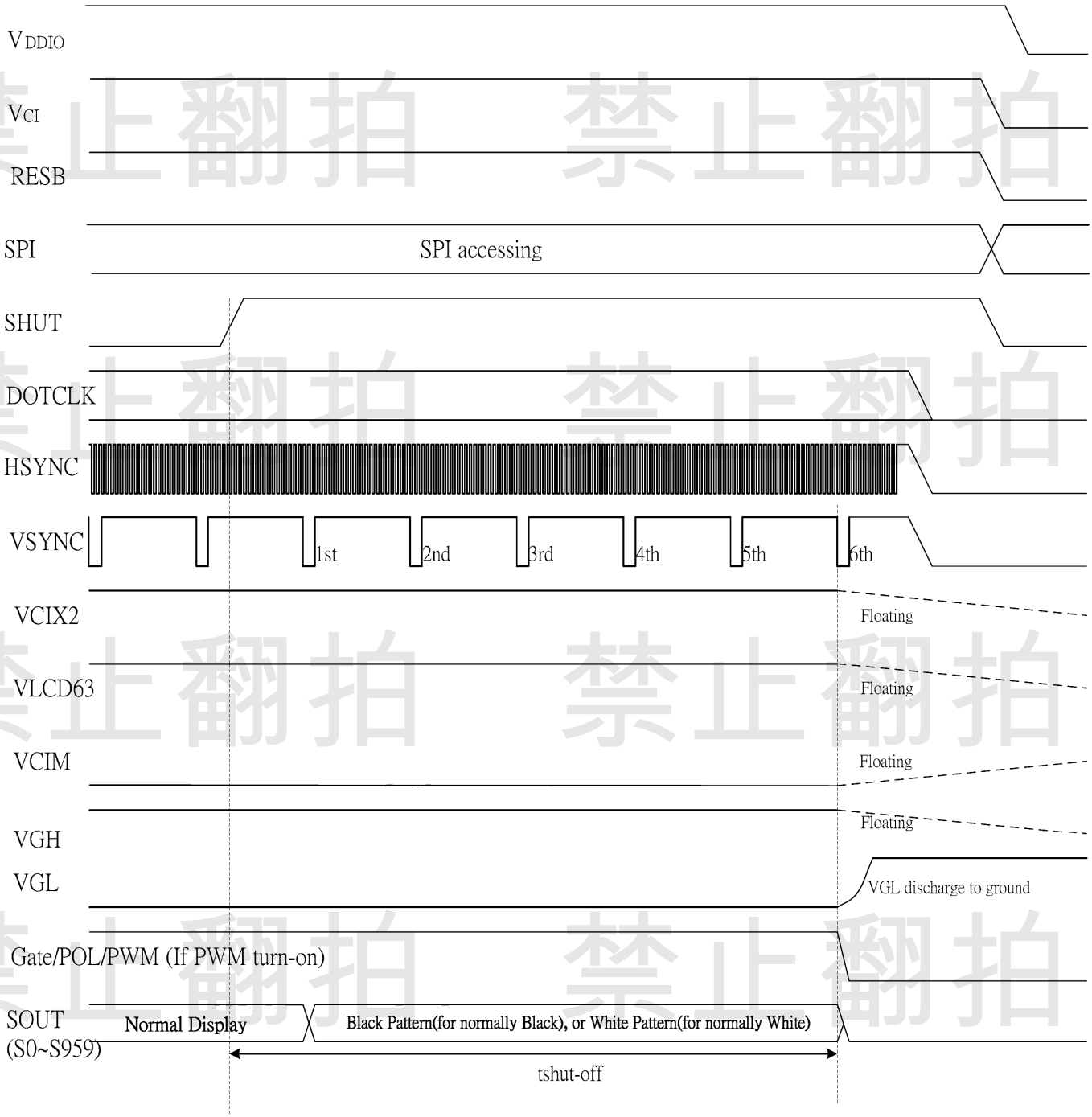


Figure 13. 15 Power Down Sequence with SHUT

Characteristics	Symbol	Min	Typ	Max	Uni
Rising edge of SHUT to display off -1 line: 408 clk -1 frame: 262 line -DOTCLK = 7.5MHz	tshut-off	-	-	6	frame

Note: DOTCLK must be maintained at lease 6 frames after the rising edge of SHUT.

Display become off at the 6nd falling edge of VSTNC after the falling edge of SHUT.

If RESET signal is necessary for power down, provide it after the 6-frames-cycle of the SHUT period.

Table 13. 4 Power Down Sequence

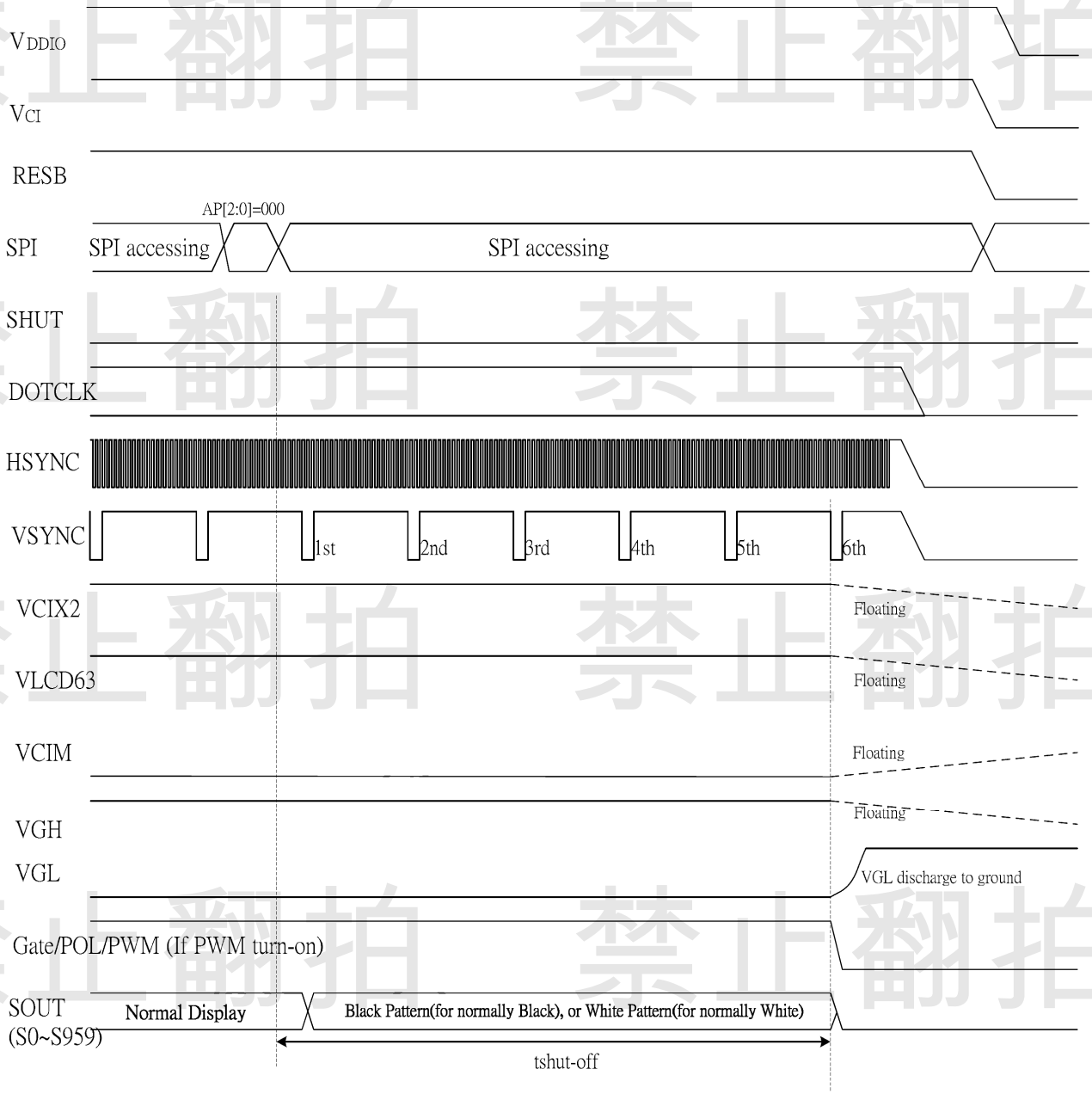
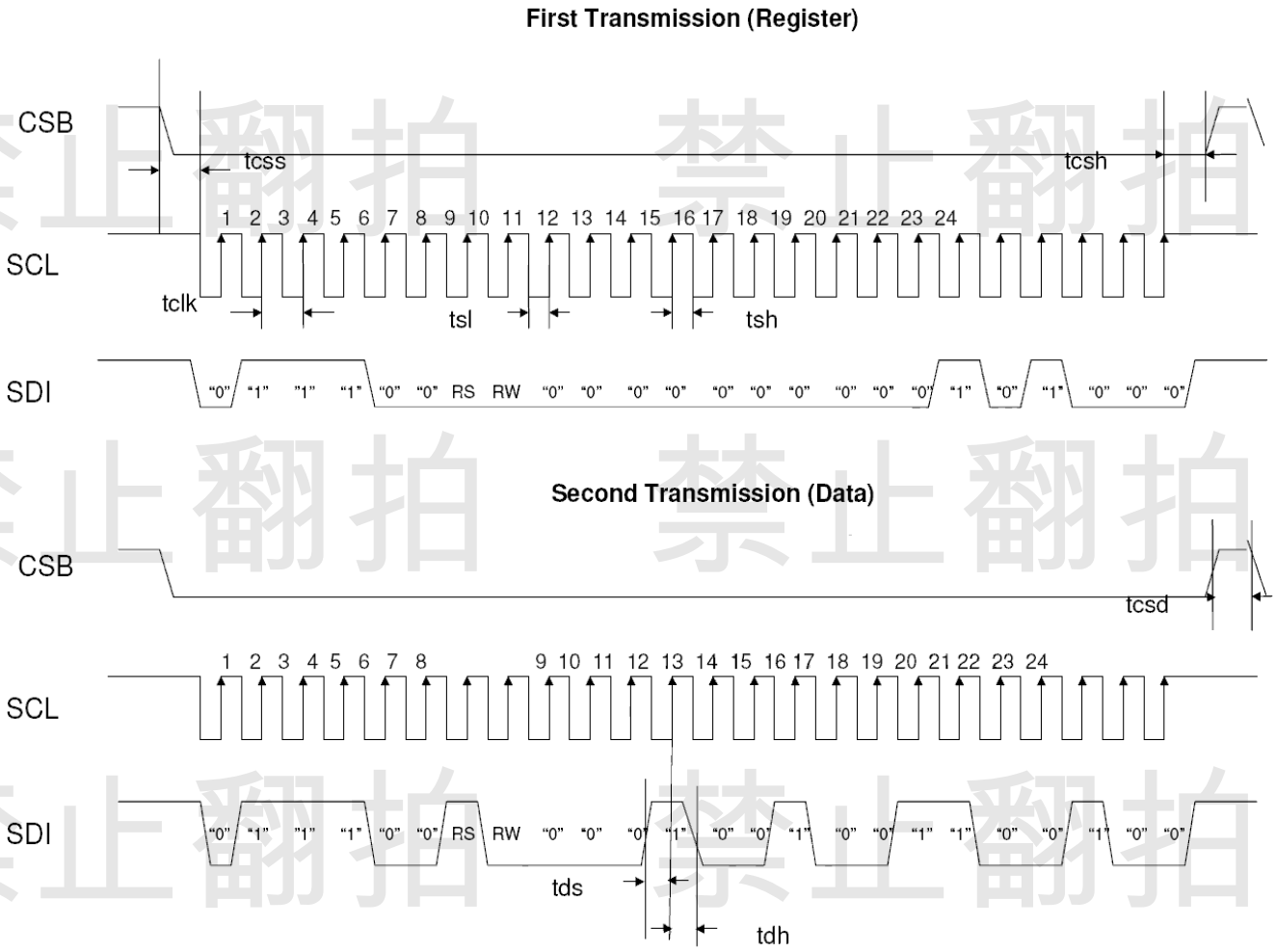


Figure 13. 16 Power Down Sequence without SHUT

2.4.6 SPI Timing



Note: The example transmit "0x1264h" to register R28h.
SPID connected to VSS.

Figure 14. 12 SPI interface Timing Diagram & Transaction Example

Characteristics	Symbol	Min	Typ	Max	Unit
Serial C ock Frequency	fclk	-	-	20	MHz
Serial Clock Cycle Time	tclk	50	-	-	ns
Clock Low Width	tsl	25	-	-	ns
Clock High Width	tsh	25	-	-	ns
Chip Select Setup Time	tcss	0	-	-	ns
Chip Select Hold Time	tcsh	10	-	-	ns
Chip Select High Delay Time	tcsd	20	-	-	ns
Data Setup Time	tds	5	-	-	ns
Data Hold Time	tdh	10	-	-	ns

Table 14. 5 SPI Timing

2.4.7 Command (Recommend by U.R.T.)

LCD_Initial_HX-8238:

COMMAND	CODE	DESCRIPTION
R02H	0200	LCD-Driving-Waveform Control
R03H	6364	Power control 1
R04H	0440	Input Data and Color Filter Control
R0DH	3221	Power Control 2
R0EH	3100	Power Control 3

Adjust the Gamma Curve:

COMMAND	CODE	DESCRIPTION
R30H	0000	Gamma Control 1
R31H	0407	Gamma Control 1
R32H	0202	Gamma Control 1
R33H	0000	Gamma Control 1
R34H	0505	Gamma Control 1
R36H	0707	Gamma Control 1
R37H	0000	Gamma Control 1
R3AH	0904	Gamma Control 2
R3BH	0904	Gamma Control 2

3. OPTICAL CHARACTERISTICS

3.1 Characteristics

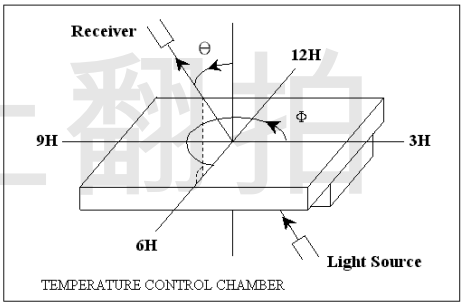
Electrical and Optical Characteristics

No.	Item			symbol / temp.		Min.	Typ.	Max.	Unit	Note
1	Response Time			Tr	25 ℃	-	15	20	ms	2
				Tf		-	35	50		
2	Viewing Angle	Hor.	Cr≧10	θ_{2+}	Φ = 0°	60	75	-	degree	3
				θ_{2-}	Φ = 180°	60	75	-		
		Ver.		θ_{1+}	Φ = 270°	45	60	-		
				θ_{1-}	Φ = 90°	60	75	-		
3	Contrast Ratio			Cr	25 ℃	500	700	-	-	4
4	Red x-code			Rx	25 ℃	0.591	0.641	0.691	-	5
	Red y-code			Ry		0.298	0.348	0.398		
	Green x-code			Gx		0.289	0.339	0.389		
	Green y-code			Gy		0.549	0.599	0.649		
	Blue x-code			Bx		0.095	0.145	0.195		
	Blue y-code			By		0.105	0.155	0.205		
	White x-code			Wx		0.285	0.335	0.385		
	White y-code			Wy		0.323	0.373	0.423		
	Brightness			Y		500	600	-	cd/m^2	
5	Brightness Uniformity				25 ℃	80	-	-	%	6

3.2 Definition of optical characteristics

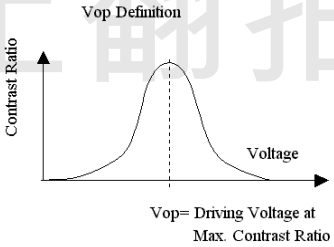
Measurement condition :

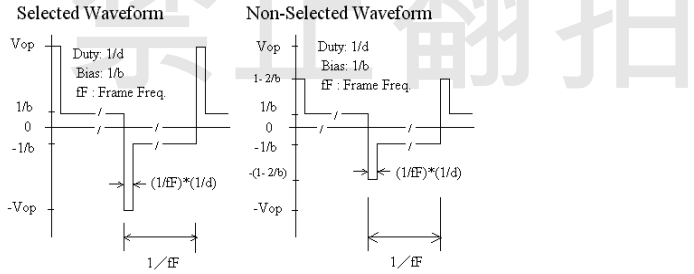
Transmissive and Transflective type



PHOTAL LCD-5000

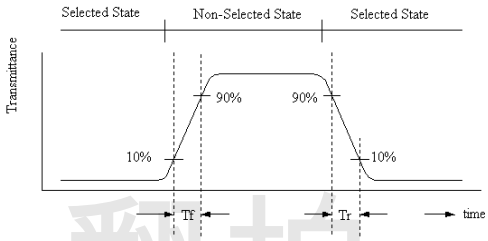
[Note 1] Definition of LCD Driving Vop and Waveform :



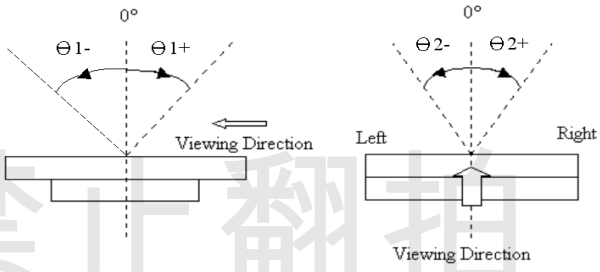


[Note 2] Definition of Response Time

for Positive type :

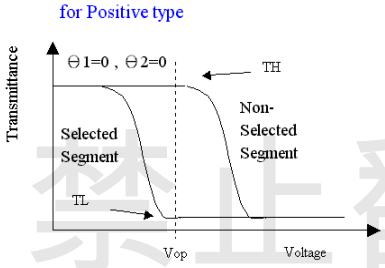


[Note 3] Definition of Viewing Angle :



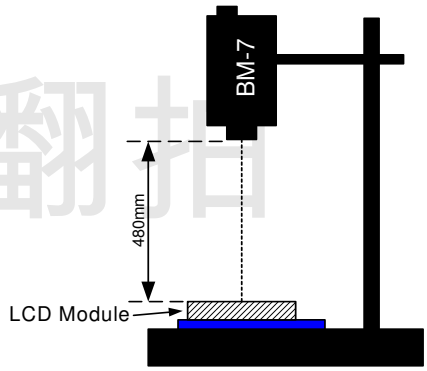
[Note 4] Definition of Contrast Ratio :

for Positive type

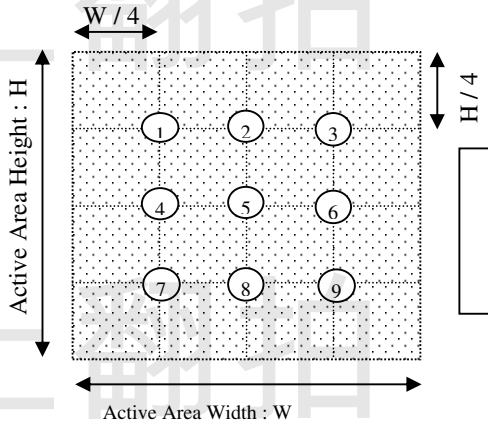


$$\text{Contrast Ratio} = \frac{TH}{TL}$$

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

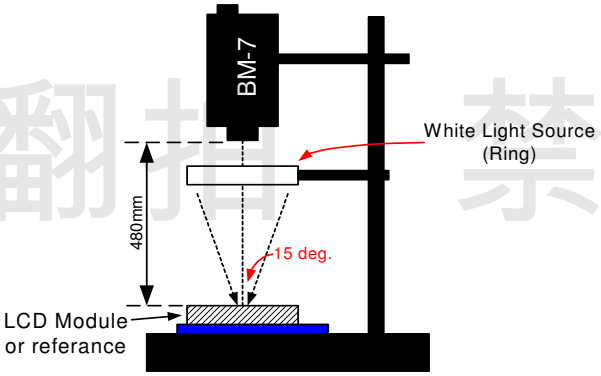


[Note 6] Definition of Brightness Uniformity



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

[Note 7] Definition of Measurement of Reflectance



4. RELIABILITY :

Item No	Items	Condition	Note
1	High temperature operating	85 ℃ , 200 hours	IEC60068-2-2 Note 1
2	Low temperature operating	-30 ℃ , 200 hours	IEC60068-2-1 Note 1
3	High temperature storage	85 ℃ , 200 hours	IEC60068-2-2 Note 1
4	Low temperature storage	-30 ℃ , 200 hours	IEC60068-2-1 Note 1
5	High temperature & humidity storage	60℃, 90%RH, 100 hours	IEC60068-2-78 Note 2
6	Thermal Shock storage	-30℃, 30min.<=> 85℃, 30min. 10 Cycles	IEC60068-2-14 Note 1
7	Vibration test	10 => 55 =>10 => 55 => 10 Hz , within 1 minute Amplitude : 1.5mm. 15 minutes for each Direction (X,Y,Z)	IEC60068-2-6
8	Drop test	>10Kg : 60 cm ; ≤10Kg : 80 cm 6 sides, 1 corner, 3edges, Free fall.	IEC60068-2-32
9	Life time	50,000 hours 25℃ , 60%RH , specification condition driving	

Note 1：The product move into the room temperature for at least 2 hours with no condensation.

Note 2：The product move into the room temperature for at least 24 hours with no condensation.

Note 3 : Please change the display picture (autorun) during operating mode. Avoid displaying static images

* 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
- Function : work normally

5. PRODUCT HANDING AND APPLICATION

5.1 PRECAUTION FOR HANDLING LCM

- The LCD module contains a C-MOS LSI. People who operate the LCM should wear ESD protection equipment to prevent ESD hurt on products.
- Do not input any signal before power is turned on.
- Do not take LCM from its packaging bag until it is assembled.
- Peel off the LCM protective film slowly since static electricity may be generated.
- Hand Soldering : Soldering temperature less than 260℃,within 5 sec, at 5 mm. Away from pin connection.
- Do not touch the display surface or connection terminals area with bare hands. Smudges on the display surface reduce the insulation between terminals.
- Do not twist or bend the modules and also avoid any inappropriate external force on display surface during assembly.
- Do not expose LCM to organic solvent. IF clean the surface , wipe it gently with soft cloth dampened by alcohol.
- Do not attempt to wiped off the contact pads.
- Keep LCM panels away from direct sunlight or fluorescent light, , also avoid them in high-temperature & high humidity environment for a long period.
- It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage then the limit cause the shorter LCD life.
- Do not drive LCM by DC voltage & avoid displaying at certain pattern for a long time otherwise it might cause image sticking.
- Response time will be extremely delayed at lower temperature then the operating temperature range and on the other hand at higher temperature LCD's how dark color in them. However those phenomena do not mean malfunction or out of order with LCD's, which will come back in the specified operation temperature.
- If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.
- Never use the LCD , LCM under 45 Hz , the liquid crystal will decomposition and cause perfectly damage on display !!
- Liquid in LCM is hazardous substance. In case a contact with liquid crystal material is occurred, be sure to immediately wash such material away by soap and water.
- The polarizer is easily damaged and should be handle with special care. Don't press or rub it with hard objects.

5.2 PRECAUTION FOR STORING

- Store the module in a dark room where must keep at 25±10℃ and 65%RH or less.
- Do not store the module in surroundings containing organic solvent or corrosive gas
- Store the module in an anti-electrostatic container or bag.

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

- For the application in medical care, safety and hazardous products or systems, an authorization from URT is required. URT will not responsible for any damage or loss which caused by the products without any authorization given by URT.
- This product is not allowed to be designed and used for military application and/or purpose.
- The delivery of this product to the countries and/or regions where the embargoes are imposed by U.N. is prohibited.
- The application and delivery of this product must comply with Strategic High-Tech Commodities (SHTC) export control and the sales to the embargoed and/or sanctioned countries or regions are strictly prohibited.

6. DATE CODE OF PRODUCTS

- Date code will be shown on each product :

- **YY MM DD - XXXX**

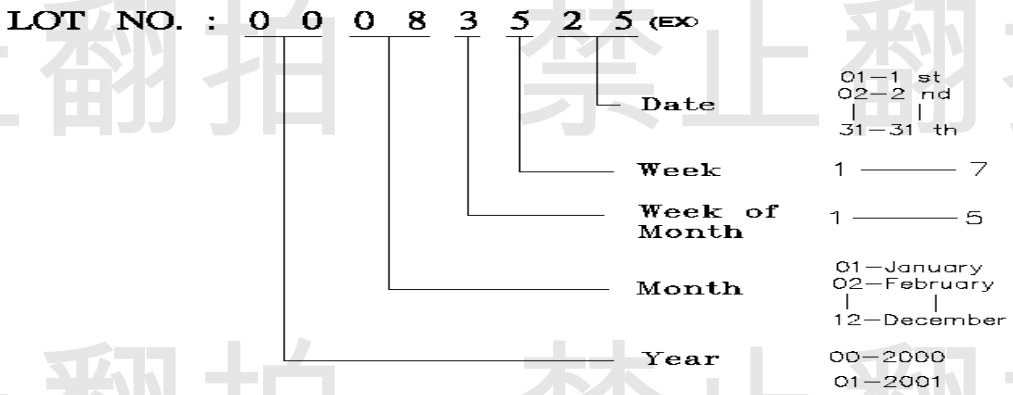
  Year Month Day - Production control number

- Example: 141108 - 0003 ==> Year 2014, November,8th ,
  Production control number no. 0003

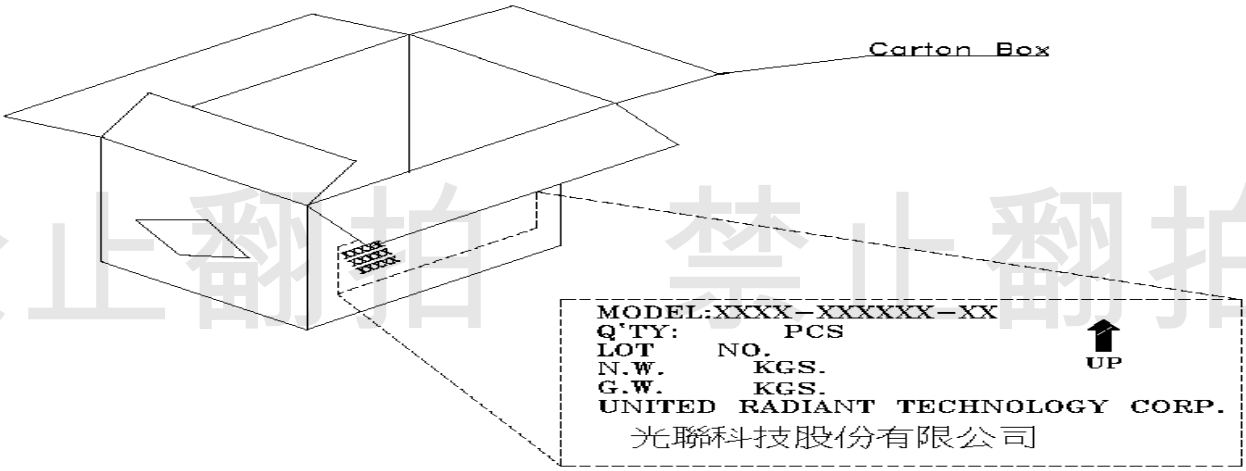
Note ： The lot no. attached on the packing box will be used for tracking once the part is too small to print the date code.

7. LOT NO

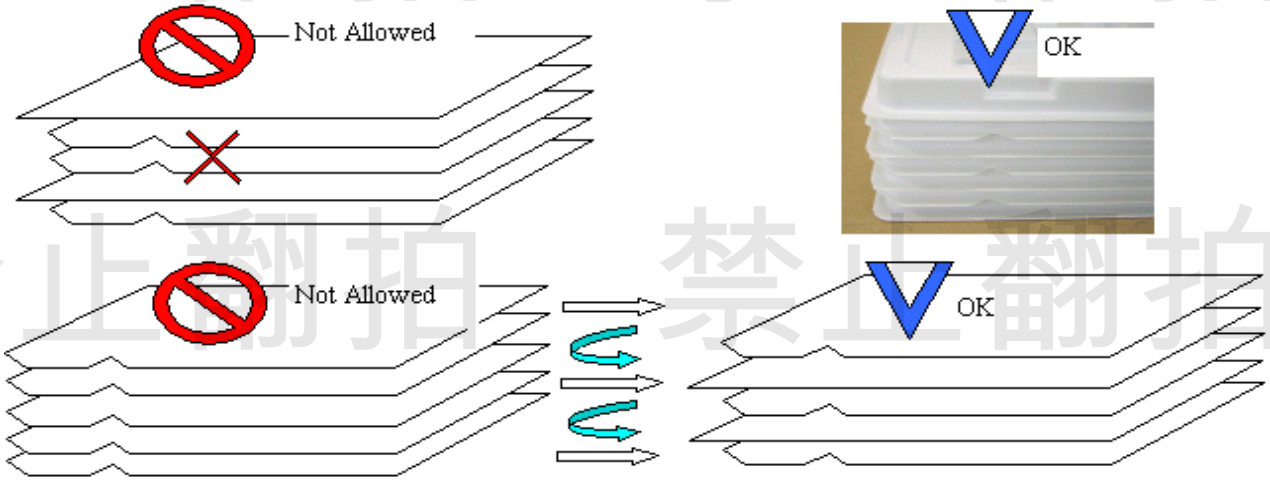
Instruction of lot number:



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 fromU.R.T. to purchaser. Purchaser shall control the LCM at -10 ℃ to 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 Insection

(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 (SAME AS MIL-STD-105E) , LEVEL Ⅱ SINGLE PLAN.

Definition	AQL(%)
CRITICAL	0.4 %
MAJOR	0.65 %
MINOR	1.5 %

EVERY ITEM SHALL BE INSPECTED ACCORDING TO THE CLASS.

8.1.3 Warranty Policy

(A) U.R.T. will provied one-year warranty for the products only if under specification operating conditions. U.R.T. will replace good products for these defect products which under warranty period and belong to the responsibility of U.R.T.

(B) The warranty period starts from delivery date.

(C) Customer is responsible for proving delivery date when customer returns defective product which is out of warranty, otherwise, the warranty period will be based on date code.

8.2 Checking Condition

8.2.1. Viewing distance is approximately：30 ± 5 cm.

8.2.2. Viewing angle is normal to the LCD panel with 45°.

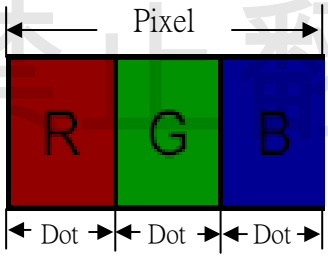
8.2.3. Ambient illuminance：2 pcs of 20W fluorescent lamps(distance to the sample >100 cm) or 1000±200 lux.

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. POLARIZER EDGE OR LCD'S SEALING LINE IS VISABLE IN THE VIEWING AREA.	ACCORDING TO DRAWING REJECTED.	Minor
	6. CANNOT BE REMOVED, BLEMISH BLACK SPOTS, WHITE SPOTS, ON THE LCD AND LCD GLASS CRACKS.	ACCORDING TO STANDARD OF VISUAL INSPECTION (INSIDE VIEWING AREA)	Minor
	7. BLEMISH、BLACK SPOT WHITE SPOT AND SCRATCH 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 (INSIDE VIEWING AREA)	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 LINE	MISSING DOT、LINE、CHARACTER ....REJECTED	Critical
	12.SHORT CIRCUIT、 WRONG PATTERN DISPLAY	NO DISPLAY、WRONG PATTERN DISPLAY、CURRENT CONSUMPTION OUT OF SPECIFICATION..... REJECTED	Critical
	13. DOT DEFECT (FOR COLOR AND TFT)	ACCORDING TO STANDARD OF VISUAL INSPECTION	Minor

Note: If Viewing Area (VA) have the same dimension with Active Area(AA), then only Active Area will be defined in the drawing , use the AA as VA for inspection judgement

8.4. STANDARD OF VISUAL INSPECTION

<table>
<tr><th>NO.</th><th>CLASS</th><th>ITEM</th><th>JUDGEMENT</th></tr>
<tr><td>8.4.1</td><td>MINOR</td><td>BLACK AND WHITE SPOT
FOREIGN MATERIEL
DUST IN THE CELL
BLEMISH
SCRATCH</td><td>(A) ROUND TYPE: unit : mm.
<table>
<tr><th>DIAMETER (mm.)</th><th>ACCEPTABLE Q'TY</th></tr>
<tr><td>Φ ≦ 0.1</td><td>DISREGARD</td></tr>
<tr><td>0.1 < Φ ≦ 0.25</td><td>3 (D>5mm)</td></tr>
<tr><td>0.25 < Φ</td><td>0</td></tr>
</table>
NOTE: Φ=(LENGTH+WIDTH)/2
(B) LINEAR TYPE: unit : mm.
<table>
<tr><th>LENGTH</th><th>WIDTH</th><th>ACCEPTABLE Q'TY</th></tr>
<tr><td>------</td><td>W ≦0.03</td><td>DISREGARD</td></tr>
<tr><td>L ≦ 5.0</td><td>0.03 < W ≦0.07</td><td>3 (D>5mm)</td></tr>
<tr><td>------</td><td>0.07 < W</td><td>FOLLOW ROUND TYPE</td></tr>
</table></td></tr>
<tr><td>8.4.2</td><td>MINOR</td><td>BUBBLE IN POLARIZER
DENT ON POLARIZER</td><td>unit : mm.
<table>
<tr><th>DIAMETER</th><th>ACCEPTABLE Q'TY</th></tr>
<tr><td>Φ ≦0.2</td><td>DISREGARD</td></tr>
<tr><td>0.2 < Φ ≦ 0.5</td><td>2 (D>5mm)</td></tr>
<tr><td>0.5 < Φ</td><td>0</td></tr>
</table></td></tr>
<tr><td>8.4.3</td><td>MINOR</td><td>Dot Defect</td><td>
<table>
<tr><th>Items</th><th>ACC. Q'TY</th></tr>
<tr><td>Bright dot</td><td>N≦ 4 (D>5mm)</td></tr>
<tr><td>Dark dot</td><td>N≦ 4 (D>5mm)</td></tr>
</table>
Pixel Define
 

Not 1: The definition of dot: The size of a defective dot over 1/2 of whole dot is regarded as one defective dot.
Not 2: Bright dot: Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.
Not 3: Dark dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green ,blue pattern.</td></tr>
</table>