

NHD-3.5-320240MF-ATXL#-1

TFT (Thin-Film-Transistor) Color Liquid Crystal Display Module

NHD-	Newhaven Display
3.5-	3.5" Diagonal
320240-	320xRGBx240 pixels
MF-	Model
A-	Built-in driver / No Controller
T-	White LED backlight
X-	TFT
L-	12:00 view, Wide Temp
#-1	RoHS Compliant

Newhaven Display International, Inc.

2511 Technology Drive, Suite 101

Elgin IL, 60124

Ph: 847-844-8795

Fax: 847-844-8796

www.newhavendisplay.com

nhtech@newhavendisplay.com

nhsales@newhavendisplay.com

Document Revision History

Revision	Date	Description	Changed by
0	7/8/2009	Initial Release	CL
1	7/29/2009	MECHANICAL DRAWING UPDATE	CL
2	1/25/2011	Viewing angle updated	AK
3	3/31/2011	Pin description / Note section updated	AK
4	4/8/2011	Contrast removed from electrical characteristics	BE
5	12/10/2012	Timing characteristics updated	AK

Functions and Features

- 320xRGBx240 resolution
- LED backlight
- 3.3V power supply
- 24-bit Parallel digital RGB interface (6.4MHz)

Technical drawing of the NHD-3.5-320240MF-ATXL#-1 display module, showing dimensions, pin assignment, and component details.

Dimensions:

- Overall width: 76.9±0.2
- Overall height: 63.9±0.2
- Bezel opening width: 72.88±0.15 (A, A70.08)
- Bezel opening height: 55.36±0.15 (9A, A62.56)
- Display area width: 54.7±0.5
- Display area height: 36.2 (36.2)
- Stiffer width: 3.2±0.15
- Stiffer height: 0.3±0.05
- Pin pitch: 0.5
- Pin width: 0.35±0.05
- Pin height: 0.125

Pin Assignment:

PIN	SYMBOL
1	LED_K
2	LED_K
3	LED_A
4	LED_A
5	NC
6	NC
7	NC
8	RESET
9	/CS
10	SCK
11	SDI
12	B0
13	B1
14	B2
15	B3
16	B4
17	B5
18	B6
19	B7
20	G0
21	G1
22	G2
23	G3
24	G4
25	G5
26	G6
27	G7
28	R0
29	R1
30	R2
31	R3
32	R4
33	R5
34	R6
35	R7
36	HSYNC
37	VSYNC
38	DOTCLK
39	NC
40	NC
41	VDD
42	VDD
43	NC
44	NC
45	NC
46	NC
47	NC
48	NC
49	NC
50	NC
51	NC
52	DEN
53	GND
54	GND

DETAIL A:

0.5
0.2
2.25
0.35±0.05
0.125
0.35±0.03
4±0.3

LED-A: ○—▷▷▷▷▷▷▷▷—○LED-K

NEWHAVEN DISPLAY INTERNATIONAL

Model: NHD-3.5-320240MF-ATXL#-1

Date: 12/07/12

Unit: mm

Gen. Tolerance: ±0.3mm

[3]

Pin Description

Pin No.	Symbol	External Connection	Function Description
1	LED-	Power Supply	Ground for backlight
2	LED-	Power Supply	Ground for backlight
3	LED+	Power Supply	Power for backlight (18mA @ 19.2V)
4	LED+	Power Supply	Power for backlight (18mA @ 19.2V)
5	NC	-	No Connect
6	NC	-	No Connect
7	NC	-	No Connect
8	/RST	MPU	Active LOW Reset
9	/CS	MPU	Active LOW Serial Chip Select
10	SCL	MPU	Serial Clock
11	SDA	MPU	Serial Data
12-19	B0-B7	MPU	Blue Data
20-27	G0-G7	MPU	Green Data
28-35	R0-R7	MPU	Red Data
36	HSYNC	MPU	Horizontal (Line) Sync
37	VSYNC	MPU	Vertical (Frame) Sync
38	DCLK	MPU	Dot Clock
39	NC	-	No Connect
40	NC	-	No Connect
41	VDD	Power Supply	Power for LCD and logic (3.3V)
42	VDD	Power Supply	Power for LCD and logic (3.3V)
43	NC	-	No Connect
44	NC	-	No Connect
45	NC	-	No Connect
46	NC	-	No Connect
47	NC	-	No Connect
48	NC	-	No Connect
49	NC	-	No Connect
50	NC	-	No Connect
51	NC	-	No Connect
52	DE	-	Data Enable (No Connect)
53	VSS	Power Supply	Ground
54	VSS	Power Supply	Ground

Recommended LCD connector: 0.5mm pitch, 54 conductor – Molex 51296-5494

Backlight connector: on LCD connector

Mates with: ---

Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Temperature Range	Top	Absolute Max	-20	-	+70	°C
Storage Temperature Range	Tst	Absolute Max	-30	-	+80	°C
Digital Supply Voltage	VDD		3.0	3.3	3.6	V
Supply Current	IDD	VDD=3.3V	-	25	-	mA
"H" Level input	Vih		0.8*VDD	-	VDD	V
"L" Level input	Vil		VSS	-	0.2*VDD	V
"H" Level output	Voh		VDD-0.4	-	VDD	V
"L" Level output	Vol		VSS	-	VSS+0.4	V
Backlight Supply Voltage	Vled		18.0	19.2	20.4	V
Backlight Supply Current	Iled	Vled=19.2V	-	18	20	mA

Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Viewing Angle – Top		Cr ≥ 10	-	60	-	°
Viewing Angle – Bottom			-	40	-	°
Viewing Angle – Left			-	60	-	°
Viewing Angle – Right			-	60	-	°
Contrast Ratio	Cr		200	350	-	
Response Time (rise)	Tr		-	10	-	ms
Response Time (fall)	Tf		-	15	-	ms

Driver Information

Built-in NT39016D driver. No controller.

Please download specification at http://www.newhavendisplay.com/app_notes/NT39016D.pdf

Note: To achieve optimum VCOM and VGL settings, the SPI interface may be used to set the following registers:

ROEh = 6Bh

ROFh = 24h

Timing Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
System Operation Timing						
VDD power source slew time	T _{POR}			1000	us	From 0V to 90% VDD
RSTB active pulse width	T _{RSTB}	40			us	VDD = 3.3V
Input Output Timing						
CLKIN clock time	T _{clk}	33.3/125	-	-	ns	Please refer to timing table(p.32)
HSD to CLKIN	T _{hc}	-	-	1	CLKIN	
HSD width	T _{wh}	1	-	-	CLKIN	
VSD width	T _{vwh}	1	-	-	Th	
HSD period time	T _h	60	63.56	67	us	
VSD setup time	T _{vst}	8	-	-	ns	
VSD hold time	T _{vhd}	10	-	-	ns	
HSD setup time	T _{hst}	8	-	-	ns	
HSD hold time	T _{hhd}	10	-	-	ns	
Data set-up time	T _{dsu}	8	-	-	ns	DIN[23:0] to CLKIN
Data hold time	T _{dhd}	10	-	-	ns	DIN[23:0] to CLKIN
DEN setup time	T _{esd}	12	-	-	ns	DEN to CLKIN
Time that VSD to 1 st line data input	T _{vs}	2	13	127	Th	@CCIR601 / 8bit RGB HV mode Control by HDLY[6:0] setting T _{vs} = HDLY[6:0]
Time that CCIR_V to 1 st line data input	T _{vs}	12	20	28	Th	@CCIR656 NTSC mode Control by HDLY[6:0] setting T _{vs} = HDLY[6:0]
Time that CCIR_V to 1 st line data input	T _{vs}	17	25	33	Th	@CCIR656 PAL mode Control by HDLY[6:0] setting T _{vs} = HDLY[6:0]
Time that VSD to 1 st line	T _{vs}	2	13	127	Th	@24bit RGB HV mode Control by HDLY[6:0] setting T _{vs} = HDLY[6:0]
Source output stable time 1	T _{st}	-	25	30	us	96% final, CL=30pF, RL=2K
Gate output stable time	T _{gst}	-	500	1000	ns	96% final, CL=40pF
VCOMOUT output stable time	T _{cst}	-	4	8	us	96% final, CL=33nF, RL=100ohm

3-wire serial communication AC timing						
Serial clock	T _{spck}	320	-	-	ns	
SPCK pulse duty		40	50	60	%	T _{ckh} / T _{spck}
Serial data setup time	T _{isu}	120	-	-	ns	
Serial data hold time	T _{ihd}	120	-	-	ns	
Serial clock high/low	T _{ckh/l}	120	-	-	ns	
Chip select distinguish	T _{cd}	1	-	-	us	
SPENB to VSD	T _{cv}	1	-	-	us	
SPENB input setup time	T _{eck}	150	-	-	ns	
SPENB input hold time	T _{cke}	150	-	-	ns	

CCIR601 Mode A/B *

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLKIN frequency	Fclk	-	24.54 /27	30	MHz	VDD = 3.0 ~3.6V
CLKIN cycle time	Tclk	-	40/37		ns	
CLKIN pulse duty	Tcwh	40	50	60	%	Tclk
Time from HSD to 1'st data input (PAL)	Ths	128	264	-	CLKIN	DDLY = 136, Offset = 128 (fixed)
Time from HSD to 1'st data input (NTSC)	Ths	128	244	-	CLKIN	DDLY = 116, Offset = 128 (fixed)

CCIR656 Mode A/B *

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLKIN frequency	Fclk	-	27	30	MHz	VDD = 3.0 ~3.6V
CLKIN cycle time	Tclk	-	37		ns	
CLKIN pulse duty	Tcwh	40	50	60	%	Tclk
Time from EAV to 1'st data input (PAL)	Ths	128	288		CLKIN	DDLY = 152, Offset = 128 (fixed)
Time from EAV to 1'st data input (NTSC)	Ths	128	276		CLKIN	DDLY = 140, Offset = 128 (fixed)

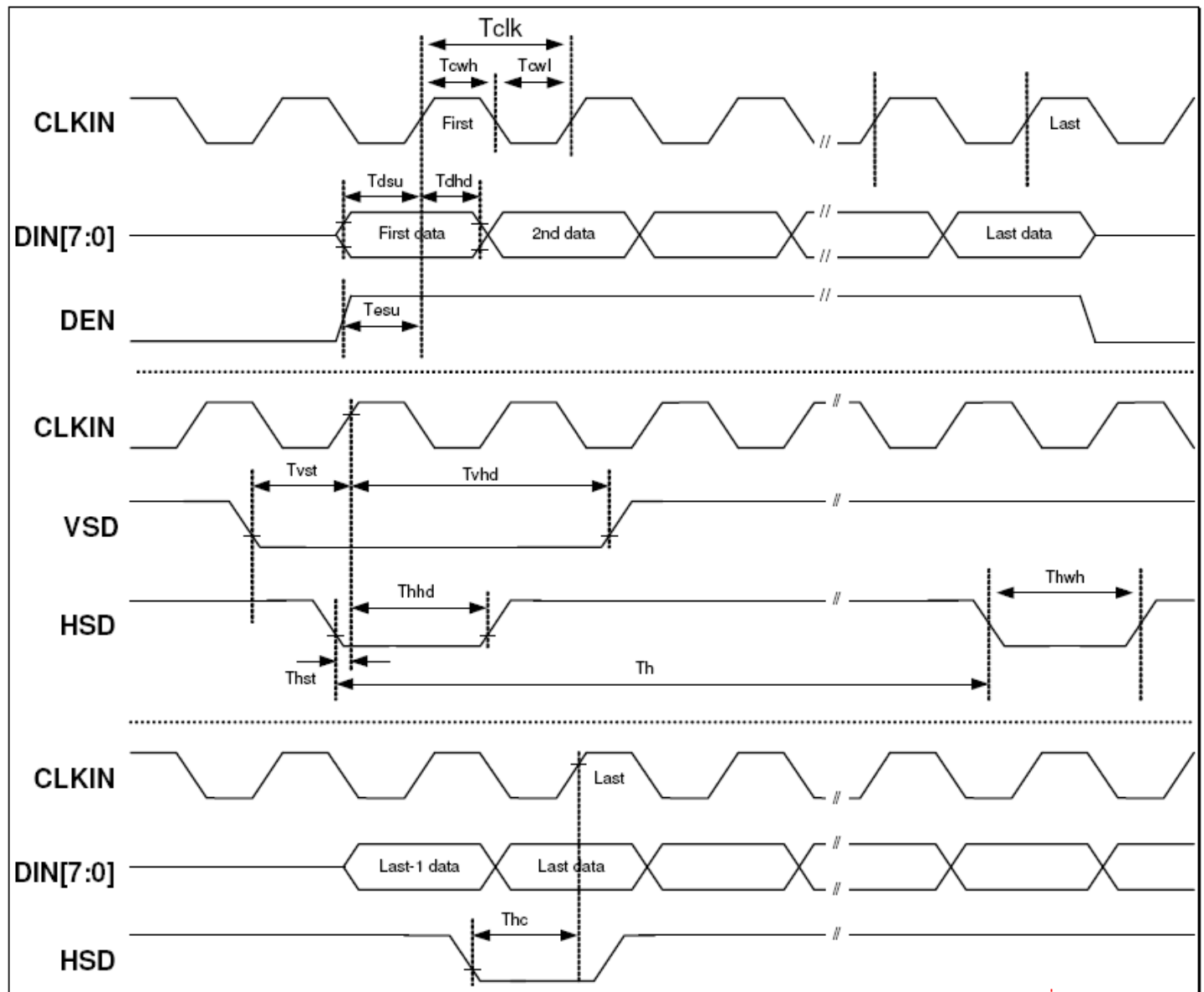
8 Bit RGB 960 CH Mode

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLKIN frequency	Fclk	-	27	30	MHz	VDD = 3.0 ~3.6V
CLKIN cycle time	Tclk	-	37		ns	
CLKIN pulse duty	Tcwh	40	50	60	%	Tclk
Time that HSD to 1'st data input(NTSC)	Ths	35	70	255	CLKIN	DDLY = 70, Offset = 0 (fixed)

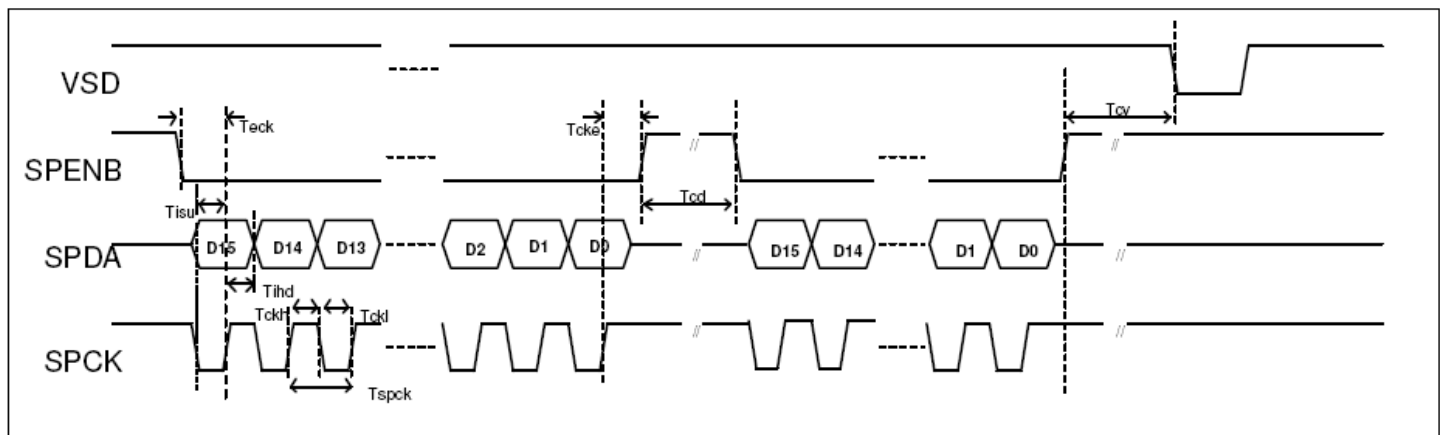
24 Bit RGB Mode (@ SEL[3:0] = 1100 or 1101)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLKIN frequency	Fclk	6.1	6.4	8.0	MHz	VDD = 3.0 ~3.6V
CLKIN cycle time	Tclk	125	156	164	ns	
CLKIN pulse duty	Tcwh	40	50	60	%	Tclk
Time that HSD to 1'st data input(NTSC)	Ths	40	70	255	CLKIN	DDLY =70, Offset = 0 (fixed)

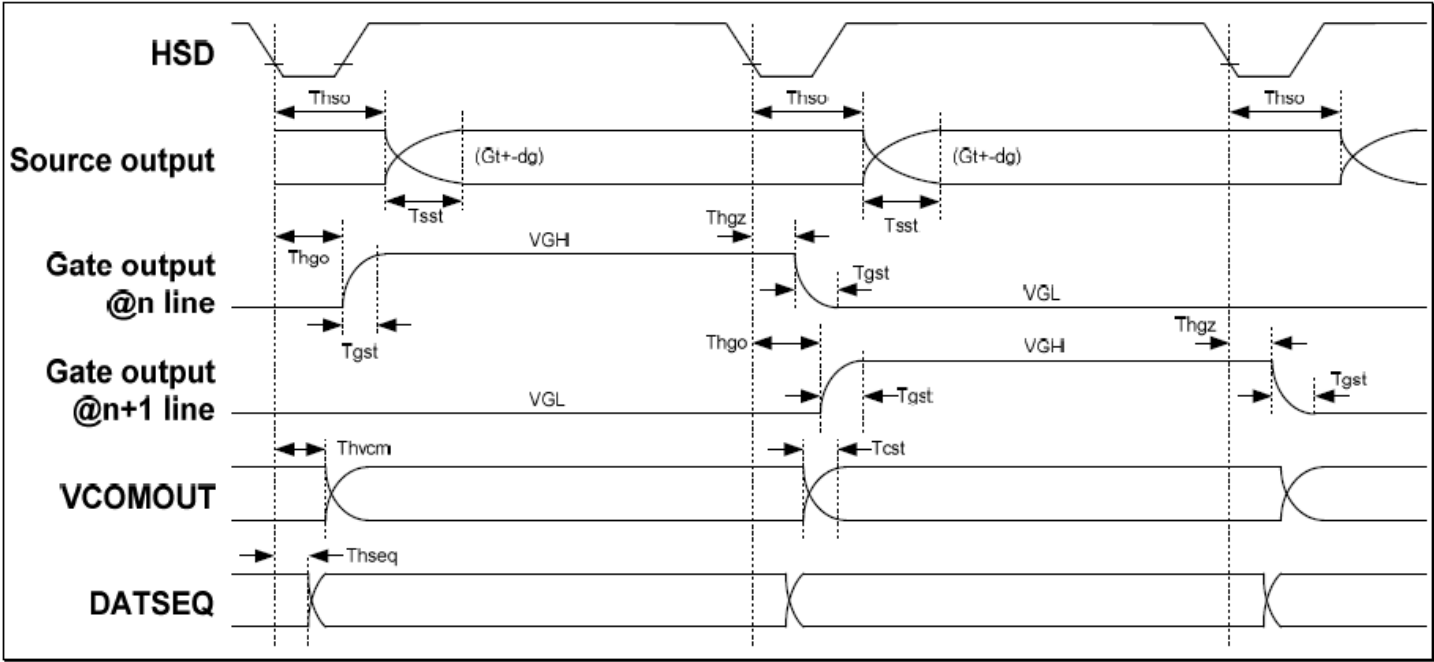
Clock and Data Input Timing Diagram



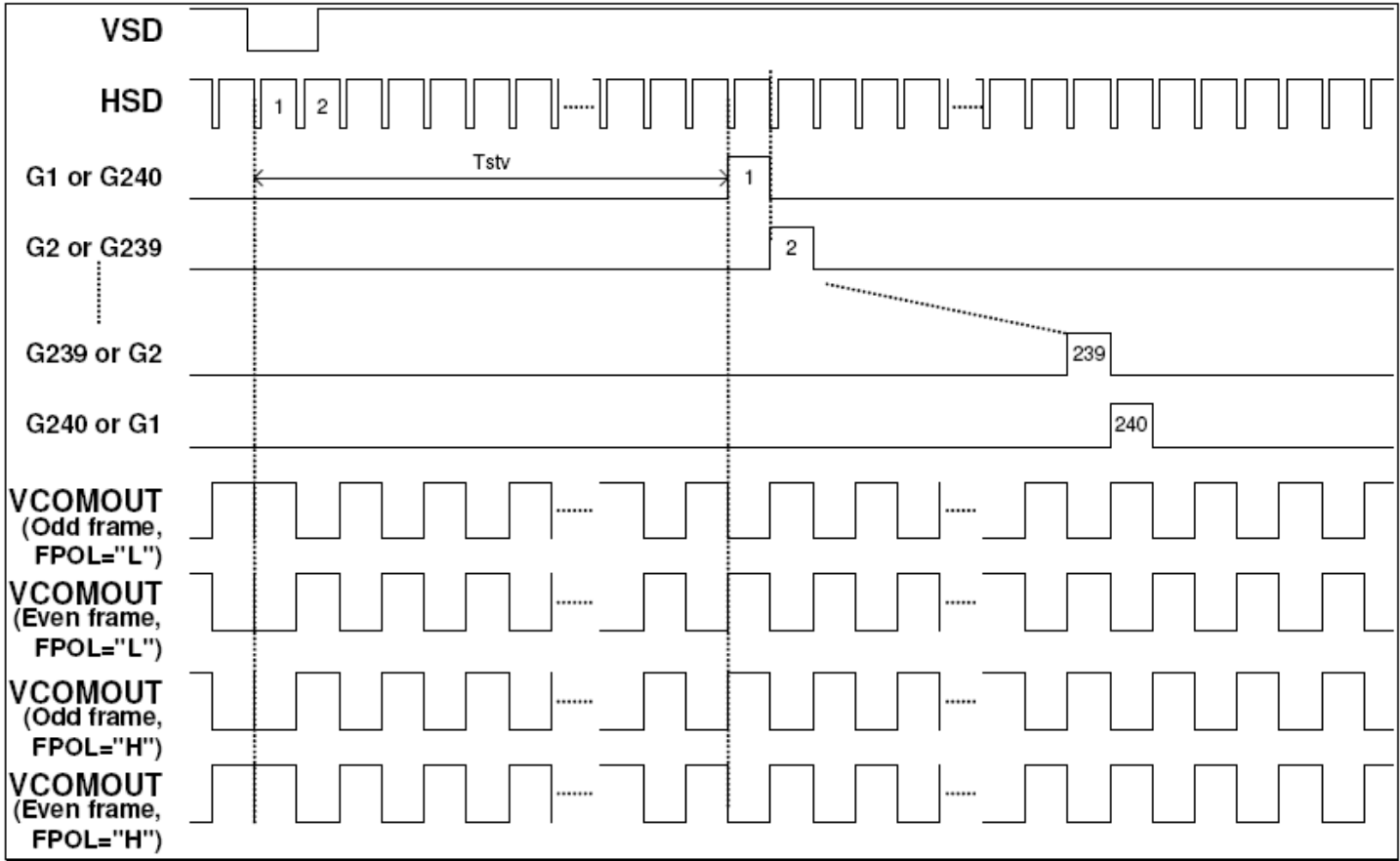
3-Wire Timing Diagram



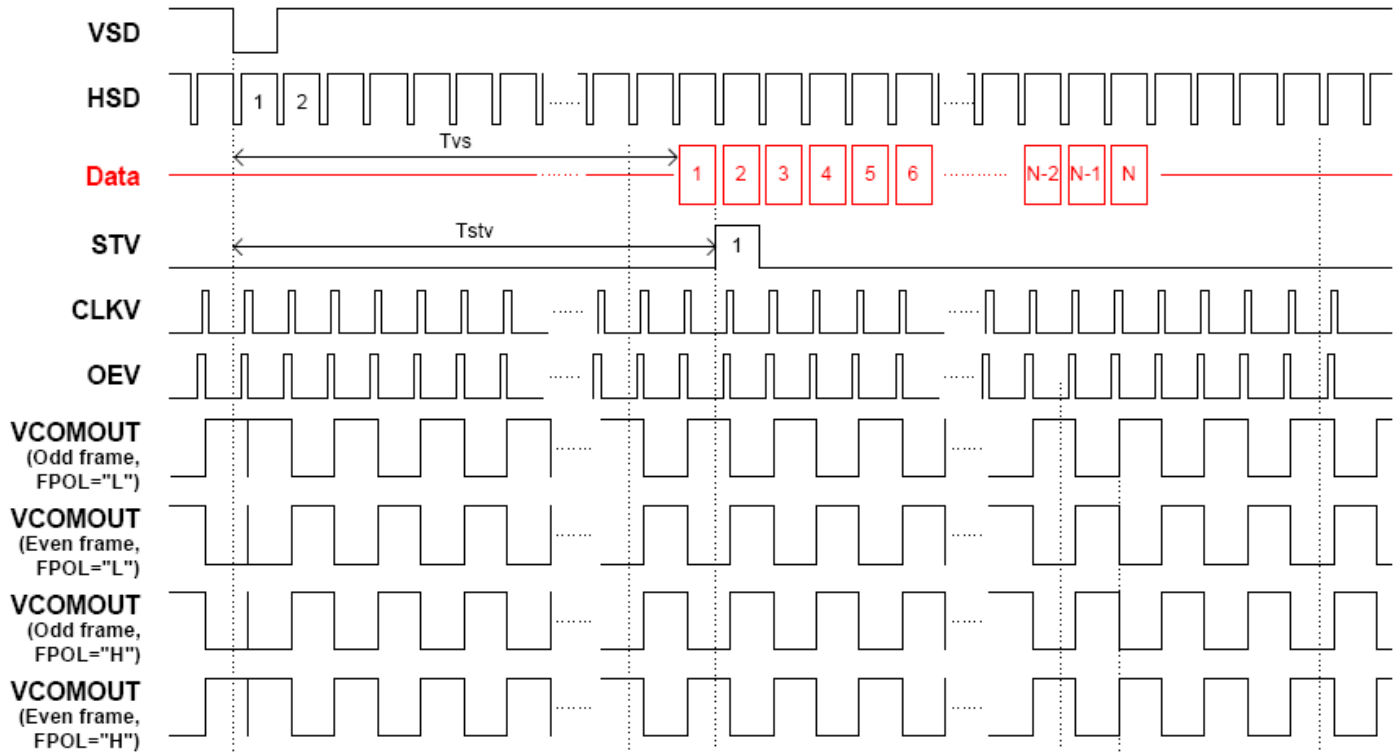
Source Driver Output Timing Diagram



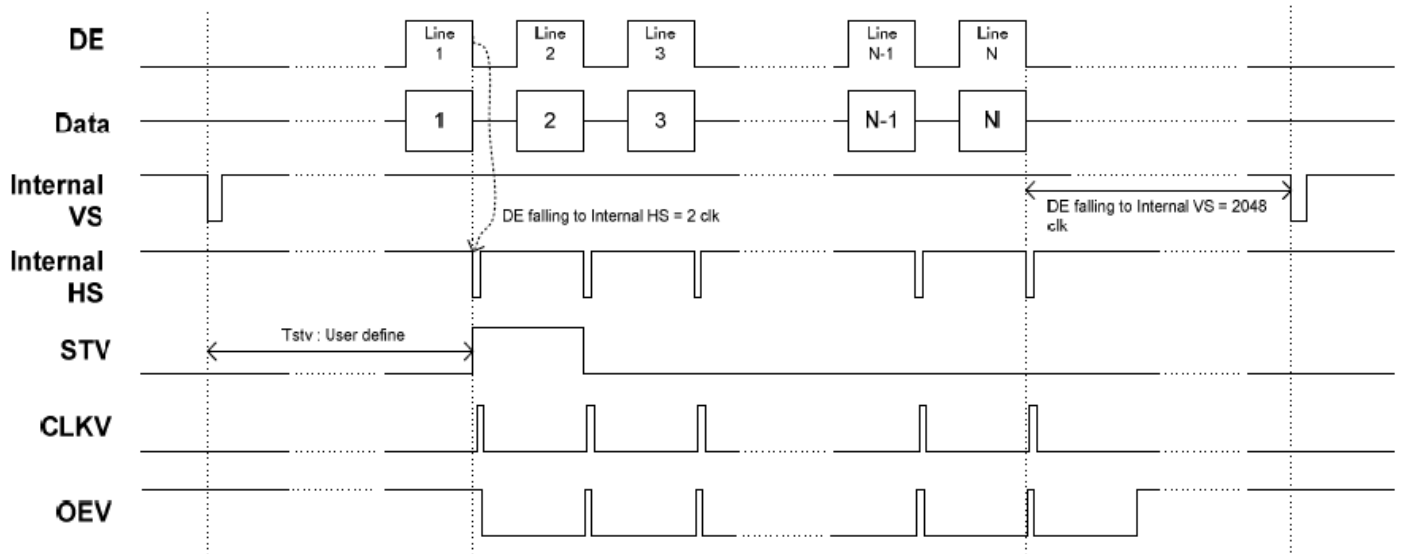
Gate Driver Output Timing Diagram



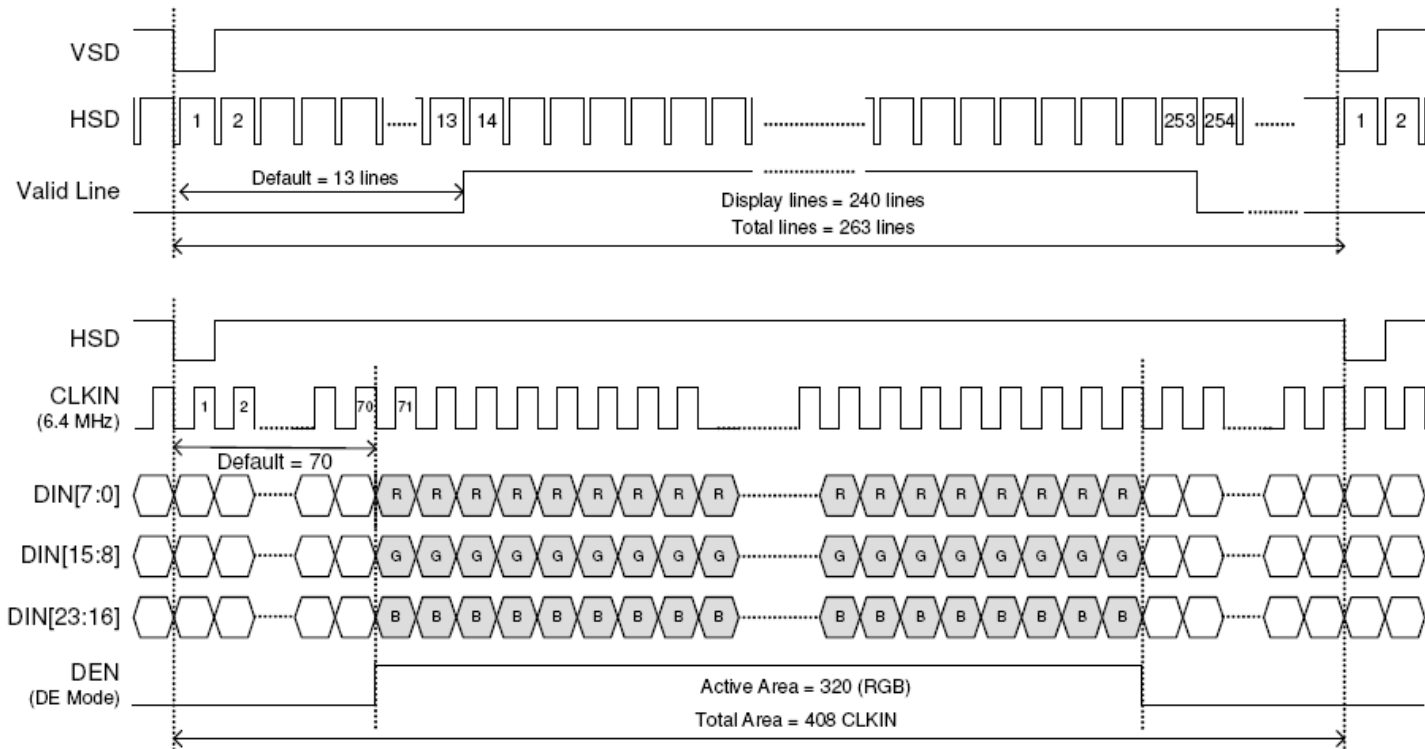
Vertical Timing Diagram (HV Mode)



Vertical Timing Diagram (DE Mode)



Input Data Timing (24 bit RGB mode for 960 x 240 @ SEL[3:0] = 1100b)



Quality Information

Test Item	Content of Test	Test Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	+70°C , 240hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30°C , 240hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (voltage & current) and the high thermal stress for a long time.	+60°C , 240hrs	2
Low Temperature Operation	Endurance test applying the electric stress (voltage & current) and the low thermal stress for a long time.	-20°C , 240hrs	1,2
High Temperature / Humidity Operation	Endurance test applying the electric stress (voltage & current) and the high thermal with high humidity stress for a long time.	+60°C , 90% RH , 160hrs	1,2
Thermal Shock resistance	Endurance test applying the electric stress (voltage & current) during a cycle of low and high thermal stress.	-30°C,30min -> 25°C,5min -> 80°C,30min = 1 cycle 100 cycles	
Vibration test	Endurance test applying vibration to simulate transportation and use.	10-55Hz , 15mm amplitude. 60 sec in each of 3 directions X,Y,Z For 15 minutes	3
Static electricity test	Endurance test applying electric static discharge.	VS=4KV, RS=330kΩ, CS=150pF Five times	

Note 1: No condensation to be observed.

Note 2: Conducted after 4 hours of storage at 25°C, 0%RH.

Note 3: Test performed on product itself, not inside a container.

Precautions for using LCDs/LCMs

See Precautions at www.newhavendisplay.com/specs/precautions.pdf

Warranty Information and Terms & Conditions

http://www.newhavendisplay.com/index.php?main_page=terms

Данный компонент на территории Российской Федерации

Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:

moschip.ru

moschip.ru_4

moschip.ru_6

moschip.ru_9