



EK79001

Rev. 1.1

DATA SHEET

1536-Output TFT LCD
Source Driver with TCON

fitipower integrated technology Inc.

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Single Chip 1536 Channel Source Driver with Timing Controller for 1024RGB × 600 TFT LCD

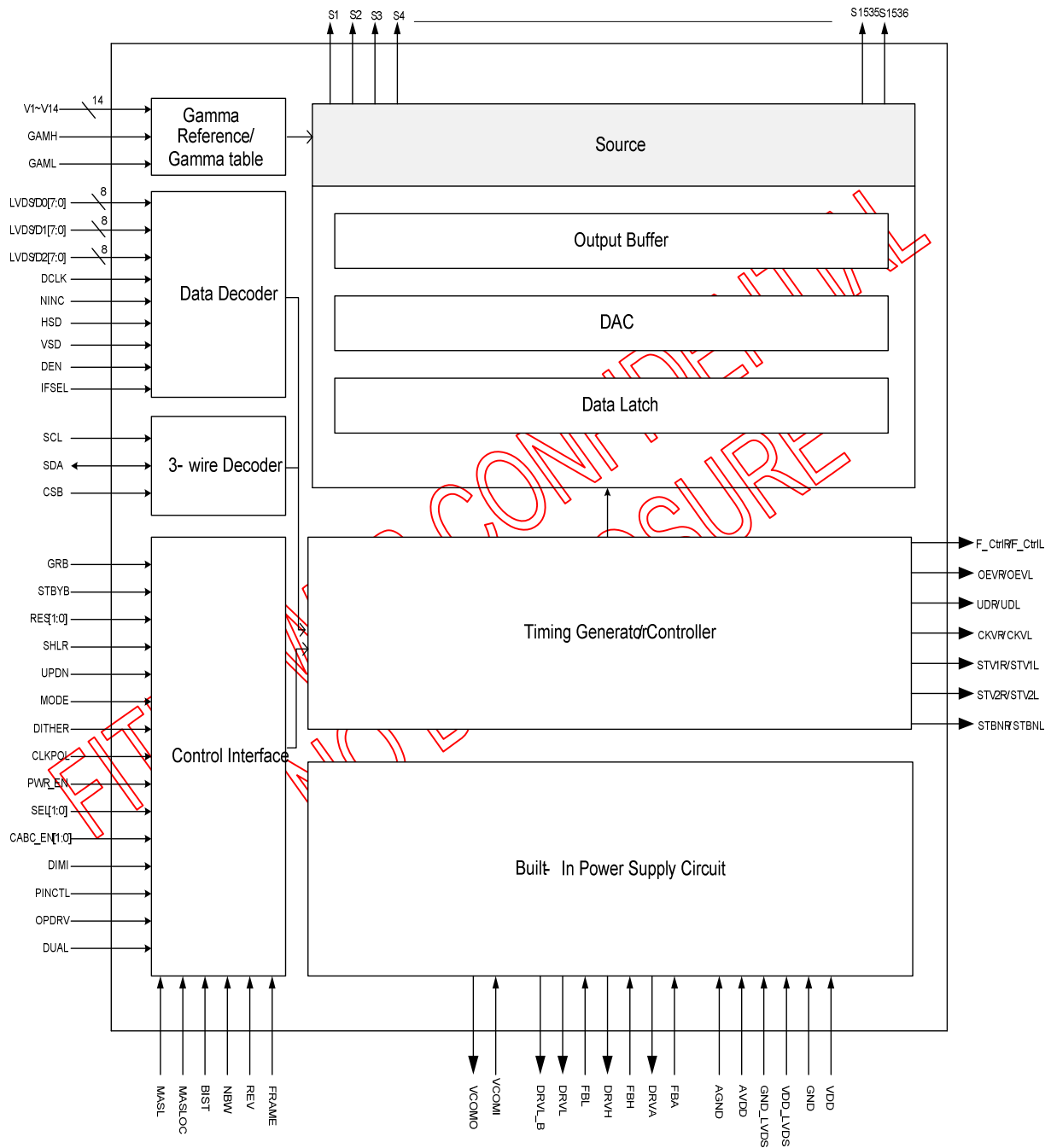
1. GENERAL DESCRIPTION

The EK79001 is a highly integrated solution for small size to middle size a-Si TFT-LCD panels. This chip integrates 1536ch dual gate mode source driver with LVDS and parallel RGB input interface.

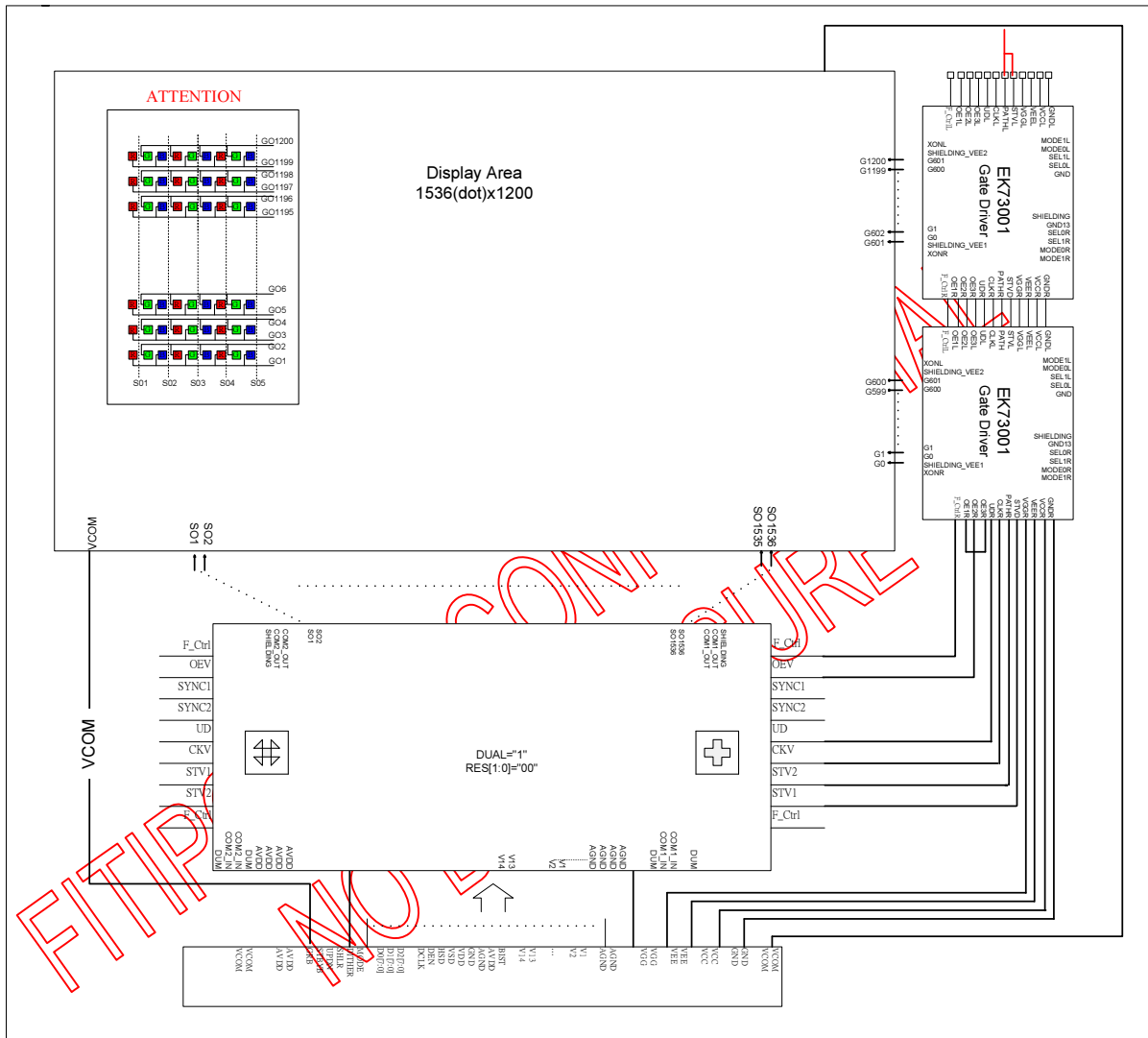
2. FEATURES

- Special design for 1024RGBx600 TFT LCD Panel with LVDS/TTL interface
- Integrate 1536 channel source driver with single or dual gate function
- Support cascade function with bidirectional shift control (CMOS signal)
- Support panel resolution (HxV) : 1024(RGB) x 768 , 1024(RGB) x 600 , 800(RGB) x 600 , 800(RGB) x 480
- 8-bit resolution 256 gray-scale with Dithering (6 bits DAC + 2 bit FRC or HFRC)
- Support Pin Control function for Up/Down, Left/Right ... control
- Power for digital circuit(VDD): 2.3V ~ 3.6V
- Power for analog circuit(AVDD): 8V ~ 13.5V
- Operating frequency : 71 MHz (Max.)
- Embedded Gamma Table for special custom request
- V1~V14 for adjusting Gamma correction
- 1 + 2 dot inversion architecture
- Built-In PWM controller for AVDD, Charge pump for VGH / VGL, and VCOM buffer
- Built-In CABC function
- Built-In AUTO pattern
- Built-In SDRRS function
- Support no. clock detection
- COG package
- Chip size = 25000um x 700um
- Output bump pitch = 15um

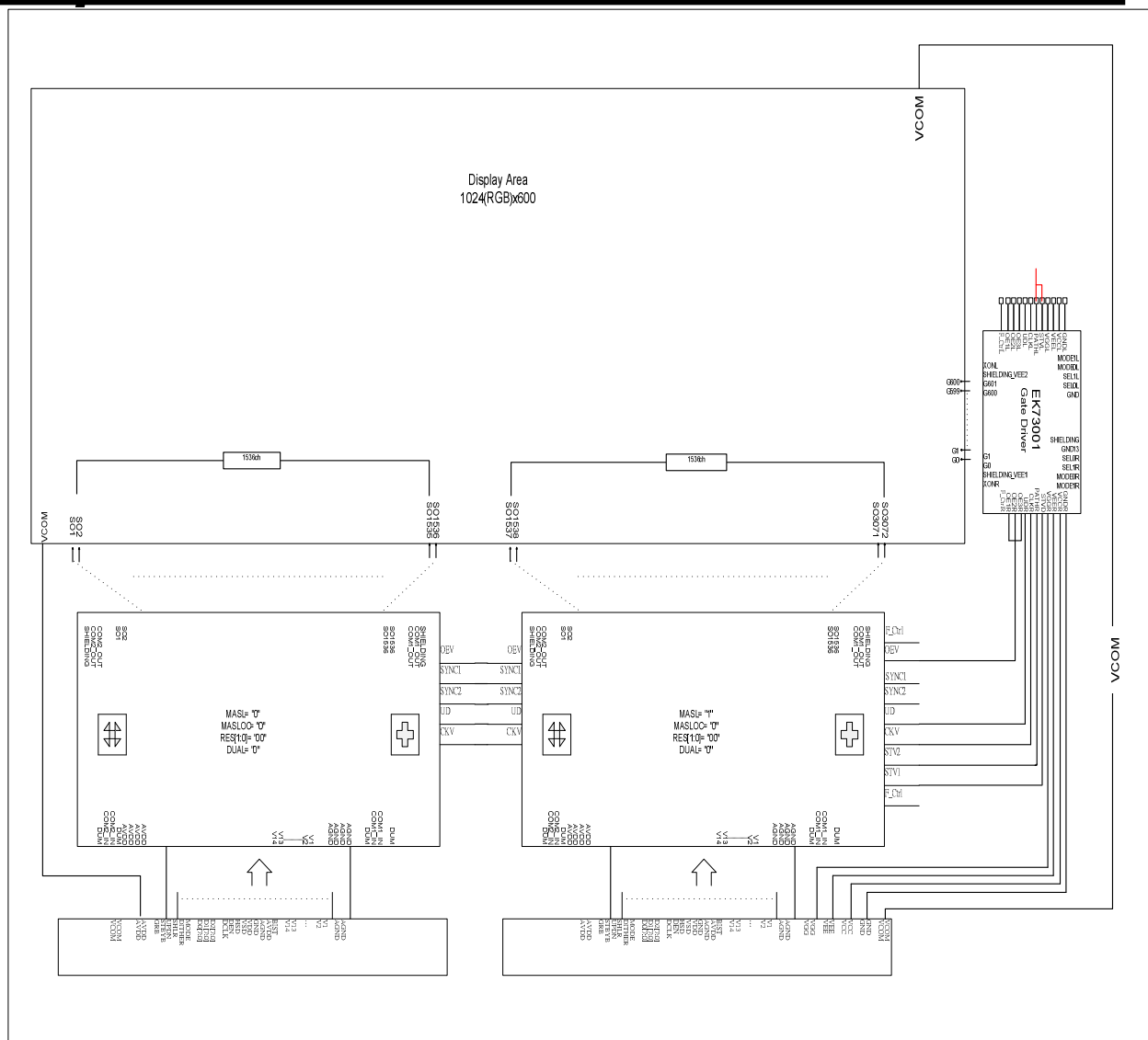
3. BLOCK DIAGRAM

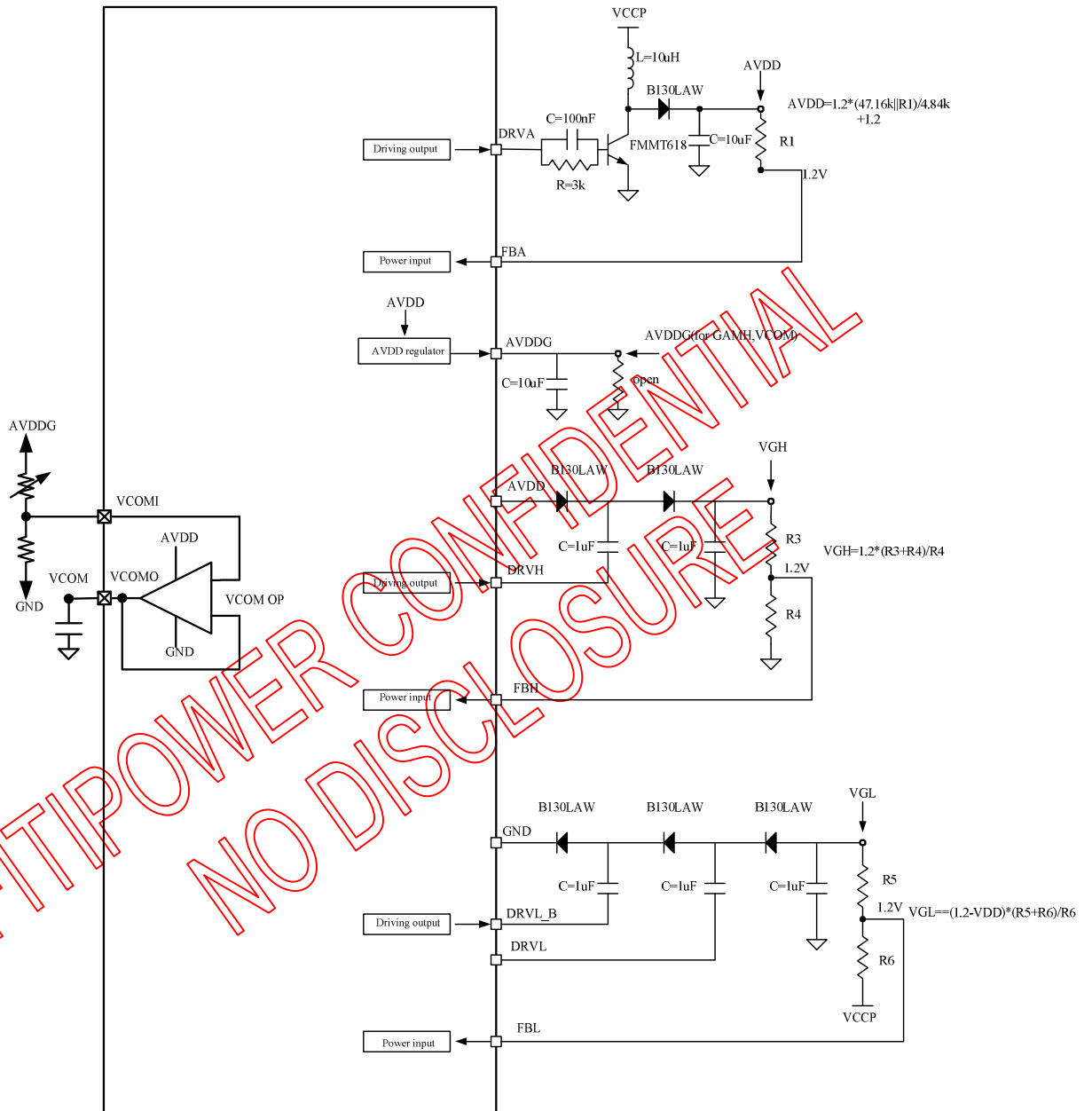


Block Diagram

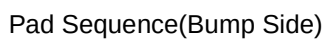


Application Block Diagram-Dual Gate Application





Application Power Circuit



4. PIN DESCRIPTION

Pin Description

Pin Name	Pin Type	Description															
D07~D00 D17~D10 D27~D20	Input	LVDS or Parallel RGB data Input. Select by "IFSEL" pin.															
		<table><tr><th>Pin name</th><th>TTL input mode IFSEL="L"</th><th>LVDS input mode IFSEL="H"</th></tr><tr><td>D2[0],D2[1]</td><td>B[0],B[1]</td><td>NIND0,PIND0</td></tr><tr><td>D2[2],D2[3]</td><td>B[2],B[3]</td><td>NIND1,PIND1</td></tr><tr><td>D2[4],D2[5]</td><td>B[4],B[5]</td><td>NIND2,PIND2</td></tr><tr><td>D2[6],D2[7]</td><td>B[6],B[7]</td><td>NIND3,PIND3</td></tr></table>	Pin name	TTL input mode IFSEL="L"	LVDS input mode IFSEL="H"	D2[0],D2[1]	B[0],B[1]	NIND0,PIND0	D2[2],D2[3]	B[2],B[3]	NIND1,PIND1	D2[4],D2[5]	B[4],B[5]	NIND2,PIND2	D2[6],D2[7]	B[6],B[7]	NIND3,PIND3
		Pin name	TTL input mode IFSEL="L"	LVDS input mode IFSEL="H"													
		D2[0],D2[1]	B[0],B[1]	NIND0,PIND0													
		D2[2],D2[3]	B[2],B[3]	NIND1,PIND1													
		D2[4],D2[5]	B[4],B[5]	NIND2,PIND2													
		D2[6],D2[7]	B[6],B[7]	NIND3,PIND3													
		LVDS 6 bit data input : PIND[2:0], NIND[2:0]. D[07:00] = R[7:0] data; D[17:10] = G[7:0] data; D[27:20] = B[7:0] data. For 18bit RGB interface, connect two LSB bits of all the R/G/B data buses to GND.															
		Note : D07~D00 -> SO1 , SO4 ... SO1531 , SO1534 D17~D10 -> SO2 , SO5 ... SO1532 , SO1535 D27~D20 -> SO3 , SO6 ... SO1533 , SO1536															
		Please note the relation between RGB data and Color Filter sequence															
Note: For LVDS interface, it's necessary to put on external terminal resistor(on FPC or PCB board) between NIND0/PIND0, NIND1/PIND1, NIND2/PIND2, NIND3/PIND3, NINC/PINC.																	
Clock Input pin for LVDS or TTL mode. Select by "IFSEL" pin																	
<table><tr><th>Pin name</th><th>TTL input mode IFSEL="L"</th><th>LVDS input mode IFSEL="H"</th></tr><tr><td>DCLK</td><td>DCLK</td><td>PINC</td></tr></table>	Pin name	TTL input mode IFSEL="L"	LVDS input mode IFSEL="H"	DCLK	DCLK	PINC											
Pin name	TTL input mode IFSEL="L"	LVDS input mode IFSEL="H"															
DCLK	DCLK	PINC															
Note: For LVDS interface, it's necessary to put on external terminal resistor(on FPC or PCB board) between NIND0/PIND0, NIND1/PIND1, NIND2/PIND2, NIND3/PIND3, NINC/PINC.																	
DCLK	Input																
NINC	Input	Negative LVDS differential clock input. Note: For LVDS interface, it's necessary to put on external terminal resistor(on FPC or PCB board) between NIND0/PIND0, NIND1/PIND1, NIND2/PIND2, NIND3/PIND3, NINC/PINC.															
HSD	Input	Horizontal Sync input for TTL mode. Negative polarity. (In LVDS interface connected HSD to FPC for pin setting HSD="L":8 bit HSD="H":6 bit)															
VSD	Input	Vertical Sync input for TTL mode. Negative polarity. (In LVDS Interface , connected to FPC and pull low)															
DEN	Input	Data Input Enable. Active High to enable the data input bus under "DE Mode". Normally pull low.															
MODE	Input	DE / SYNC mode select under TTL mode. Normally pull high H : DE mode. L : HSD/VSD mode.															
IFSEL	Input	IFSEL = L : TTL interface IFSEL = H : LVDS interface															

Pin Name	Pin Type	Description
RES[1:0]	Input	RES[1:0]="01", for 1024(RGB)*768 display resolution(dual or cascade) RES[1:0]="00", for 1024(RGB)*600 display resolution(dual or cascade (Default) RES[1:0]="10", for 800(RGB)*600 display resolution(dual or cascade) (601~936 channel disable) RES[1:0]="11", for 800(RGB)*480 display resolution(dual or cascade) (601~936 channel disable)
DITHER	Input	Dithering function enable control. Normally pull low. In LVDS 6-bit mode, IC don't care DITHER and HFRC setting. DITHER = "1", Enable internal dithering function. DITHER = "0", Disable internal dithering function. If in LVDS 8-bit or TTL mode, IC will bypass D01/D00, D11/D10, D21/D20.
HFRC	Input	H-FRC selection. Normally pull low. HFRC = H : H-FRC enable. If "DITHER"="1", disable dithering function(HFRC and FRC disable)
DCLKPOL	Input	Input clock edge selection. Normally pull low. CLKPOL = "1", Latch data at DCLK rising edge. CLKPOL = "0", Latch data at DCLK falling edge. (Default)
DUAL	Input	Dual Gate function enables control. Normally pull high. DUAL = "1", Enable Dual Gate Function. (Default) DUAL = "0", Disable Dual Gate Function Note: Cascade function will be disabled under "dual gate" mode!!
V1~V14	Input	When INTERNAL Gamma Table is used. GAMH tied to AVDDG , GAML tied to GND and V1~V14 pad are un-used. When using external gamma voltage, GAMH and GAML are floating , and V1~V14 are the external gamma correction points. The voltage of these pins must be: AGND<V14<V13<V12<V11<V10<V9<V8; V7<V6<V5<V4<V3<V2<V1<AVDD .
GAMH	Input	When using INTERNAL Gamma Table , tied to AVDDG . Otherwise floating.
GAML	Input	When using INTERNAL Gamma Table , tied to GND . Otherwise floating.
GRB	Input	Global reset pin. Active Low to enter Reset State. Normally pull high. It's necessary to connecting with an RC delay circuit for stability. (GRB delay VDD larger than 1ms)
STBYB	Input	Standby mode, Normally pulled high. STBYB = "1", normal operation STBYB = "0", timing controller, source driver will turn off, all output are High-Z
MASL	Input	Master and Slave Mode selection. Normally pull high. MASL = "H", for Master mode. (Default Mode) MASL = "L", for Slave mode. Only the Master chip will issue the Gate and Cascade control signal.
MASLOC	Input	Master location definition pin. Normally pull low. MASLOC = "L", Master locate on right side (Panel top view). (Default Mode) MASLOC = "H", Master locate on left side (Panel top view).

Pin Name	Pin Type	Description		
SHLR	Input	Source Right or Left sequence control. Normally pull high. SHLR = "L", shift left: last data = S1←S2←S3.....←S1536 = first data. SHLR = 'H' , shift right: first data = S1→S2→S3.....→S1536 = last data.		
UPDN	Input	Gate Up or Down scan control. Normally pull low. UPDN = "L", STV2 output vertical start pulse and UD pin output logical "0" to Gate driver. UPDN = "H", STV1 output vertical start pulse and UD pin output logical "1" to Gate driver.		
BIST	Input	Normal Operation/BIST pattern select. Normally pull low BIST = H : BIST(DCLK input is not needed) BIST = L : Normal Operation		
NBW	Input	Normally black or normally white setting. Normally pulled low. NBW = H : Normally black NBW = L : Normally white		
REV	Input	Controls whether the data of D00~D27 are inverted or not, normally pulled low. When "REV"=1 these data will be inverted. EX. "00"→"3F", "07"→"38", "15"→"2A", and so on.		
FRAME	Input	Frame inverse or not select. Normally pull low. FRAME = "1", Uniform FRAME = "0", Frame inverse (Default)		
SEL[1:0]	Input	Gate on sequence select. Normally pull low		
		SEL[0]	SEL[1]	Pin control function
		1	1	Z+2
		1	0	2
		0	1	3
0	0	Z(default)		
OEVR/OEVL	Output	Gate driver control signal (CABC and BIST sync control)		
SYNC1R/SYNC1L	Output	CABC and BIST sync control		
SYNC2R/SYNC2L	Output	CABC and BIST sync control		
UDR/UDL	Output	Gate driver control signal (CABC and BIST sync control)		
CKVR/CKVL	Output	Gate driver control signal (CABC and BIST sync control)		
STV1R/STV1L	Output	Gate driver control signal		
STV2R/STV2L	Output	Gate driver control signal		
STBNR/STBNL	Output	Gate driver control signal		
F_CtrlR/F_CtrlL	Output	Gate driver control signal (For special Gate on sequence). NOTE : In Cascade structure, let this pin floating. In Dual Gate structure , connect this pin to gate driver's F_Ctrl . And setting gate driver's SEL[1:0] to "00".		
CABC_EN[1:0]	Input	CABC H/W enable pin. Normally pull low. When CABC_EN="00", CABC OFF. (Default mode) When CABC_EN="01", User interface Image. When CABC_EN="10", Still Picture. When CABC_EN="11", Moving Image.		
DIMI	Input	Brightness control signal. Normally pull high.		

Pin Name	Pin Type	Description
DIMO	Output	Backlight dimmer signal for external controller. DIMO = "0", Turn off external backlight controller DIMO = "1", Logical control signal to turn on external backlight controller NOTE : If CABC OFF , DIMO = DIMI . Else DIMO is controlled by CABC
PINCTL	Input	Enable pin control function. Normally pull high PINCTL="0", Disable pin control function. The following pin will be inactive: MODE,RES[1:0],DITHER,HFRC,DCLKPOL,SHLR,UPDN,BIST,NBW,FRAME,SEL[1:0],CABC_EN[1:0],OPDRV,PWR_EN. PINCTL="1", Enable pin control function. NOTE: The related 3-wire control register bit control will be disabled under PINCTL="1".
OPDRV	Input	Source OP driving selection. Normally pull low OPDRV = H : 133% OPDRV = L : normal
CSB	Input	Serial communication chip select. Normally pull low
SDA	Input/Output	Serial communication data input. Normally pull low
SCL	Input	Serial communication clock input. Normally pull low
AVDD	PI	Power supply for analog circuits
AGND	PI	Ground pins for analog circuits
VDD	PI	Power supply for digital circuits
GND	PI	Ground pins for digital circuits
VDD_LVDS	PI	LVDS power
GND_LVDS	PI	LVDS ground
PWR_EN	Input	POWER enable. Normally pull low PWR_EN = H , enable PWM , Charge pump and VCOM buffer PWR_EN = L , disable PWM , Charge pump and VCOM buffer
FBA	VI	PWM controller feedback input. (for AVDD)
DRVA	Output	PWM output driver signal for the boost converter (for AVDD)
FBH	VI	Charge Pump controller feedback input. (for VGH)
DRVH	Output	Charge Pump driver signal for the boost converter (for VGH)
FBL	VI	Charge Pump controller feedback input. (for VGL)
DRVL	Output	Charge Pump driver signal for the boost converter (for VGL)
DRVL_B	Output	Inverse of DRVL(for VGL)
VCOMI	Input	VCOM buffer in
VCOMO	Output	VCOM buffer out
AVDDG	Output	AVDD regulator output
SO1~SO1536	Output	Source Driver Output Signals All outputs will be of unknown values under stand-by mode.
COM1_IN COM1_OUT	S	Internal link together between input side and output side
COM2_IN COM2_OUT	S	Internal link together between input side and output side.
TP	T	Float these pins for normal operation
SHIELDING	SH	Those pins are internally connected to the AGND. DO NOT connect to any WOA on the panel. Data Bus Shielding pad
DASHD	SH	Those pins are internally connected to the GND. RECOMMAND to add shielding lines on the FPC to reduce EMI.

Pin Name	Pin Type	Description
DUM	Dummy	Dummy pads. Those pins are floating pads.

Note:

P: Power, D: Dummy, S: Shorted line, M: Mark, PI: Power input, PO: Power output,
T: Testing, SH: Shielding, PS: Power Setting, C: Capacitor pin.

EK79001 Pass Line Description:

Pass Line No:	Pad Name	
1	COM1_IN	COM1_OUT
2	COM2_IN	COM2_OUT

4.1. Value of wiring resistance to each pin

The recommended wiring resistance values are shown below. The wiring resistance values affect the current capacity of the power supply, so be sure to design using values that do not exceed those recommended.

wiring resistance

Pin Name	Wiring Resistance value(Ω)	Pin Name	Wiring resistance value (Ω)
AVDD	<5	RES0	<100
AGND	<5	RES1	<100
VDD	<5	SHLR	<100
GND	<5	UPDN	<100
V1~V14	<5	BIST	<100
DRVx	<5	MODE	<100
FBx	<5	DCLKPOL	<100
VCOMI	<5	DIMO	<100
VCOMO	<5	IFSEL	<100
D00~D07	<5	F_Ctrlx	<500
D10~D17	<5	OEVx	<500
D20~D27	<5	UDx	<500
DCLK	<5	CKVx	<500
NINC	<5	STV1x	<500
VSD	<20	STV2x	<500
HSD	<20	STBNx	<500
DEN	<20	VGH	<10
GRB	<100	VGL	<10
STBYB	<100		
DITHER	<100		

5. 3_WIRE SERIAL PORT INTERFACE

5.1. 3-Wire Command Format

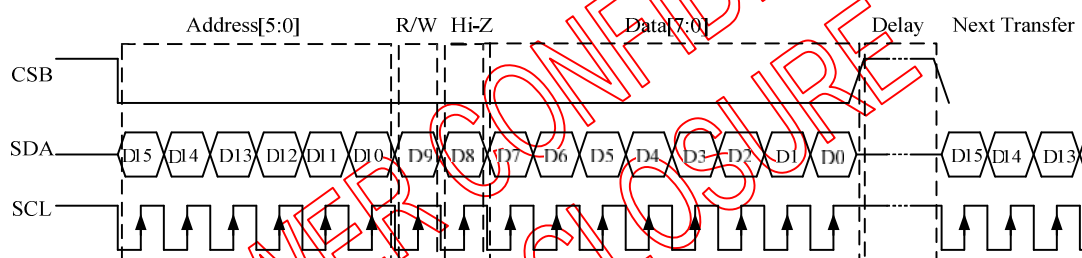
EK79001 use the 3-wire serial port as communication interface for all the function and parameter setting.

3-Wire communication can be bi-directional controlled by the "R/W" bit in address field. EK79001 3-Wire engine act as a "slave mode" for all the time, and will not issue any command to the 3-Wire bus itself.

Under read mode, 3-Wire engine will return the data during "Data phase". The returned data should be latched at the rising edge of SCL by external controller. Data in the "Hi-Z phase" will be ignored by 3-Wire engine during write operation, and should be ignored during read operation also. During read operation, external controller should float SDA pin under "Hi-Z phase" and "Data phase".

Each Read/Write operation should be exactly 16 bit. To prevent from incorrect setting of the internal register, any write operation with more or less than 16 bit data during a CSB Low period will be ignored by 3-Wire engine.

For prevent from incorrect setting of the internal register. Please refer to the section of "3-Wire Timing".



3-Wire timing chart

3-Wire Command Format

Bit	Description
D15~D10	Register Address [5:0].
D9	W/R control bit. "0" for Write; "1" for Read
D8	Hi-Z bit during read mode. Any data within this bits will be ignored during write mode
D7~D0	Data for the W/R operation to the address indicated by Address phase

3-Wire Write Format

MSB															LSB
D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
Register Address[5:0]						0	X	Data(Issue by external controller)							

3-Wire Read Format

MSB															
D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
Register Address[5:0]						1	Hi-Z	Data(Issue by 3-wire engine)							

3-Wire Control Registers:

Following table list all the 3-Wire control registers and bit name definition for EK79001. Refer to the next section for detail register function description please.

Setting of all the 3-Wire registers will take effect at the coming falling edge of VSD except GRB and STB bit.

R0: System Control Register:

Designation	Address	Description
Mode	R0[0]	DE/SYNC mode select. MODE="0", HSD/VSD mode MODE="1", DE mode(default)
DCLKPOL	R0[1]	DCLK polarity control bit. DCLKPOL="0": Data sampling at DCLK falling edge. (Default) DCLKPOL="1": Data sampling at DCLK rising edge.
GRB	R0[2]	Global reset bit. GRB="0", The controller is in reset state. GRB="1", Normal operation. (Default)
STBYB	R0[3]	Standby mode selection bit. STBYB="0", Timing control, driver and DC-DC converter, are off, and all outputs are High-Z. STBYB="1", Normal operation. (Default)
UPDN	R0[4]	G Gate Up or Down scan control. UPDN = "0", STV2 output vertical start pulse and UD pin output logical "0" to Gate driver. (Default) UPDN = "1", STV1 output vertical start pulse and UD pin output logical "1" to Gate driver.
SHLR	R0[5]	Right/Left sequence control of source driver. SHLR="0", Shift left: Last data = S1<S2<S3<...<S960=First data SHLR="1", Shift right: First data = S1<S2<S3<...<S960=Last data(Default)
	R0[6]	Reserved
PWM_EN	R0[7]	POWER enable. PWR_EN = H: enable PWM, Charge pump and VCOM buffer PWR_EN = L: disable PWM, Charge pump and VCOM buffer (Default)

R1: System Control Register:

Designation	Address	Description
		Reserved
RES[1:0]	R1[2:1]	RES[1:0] = "01", for 1024(RGB)*768 display resolution(dual or cascade) RES[1:0] = "00", for 1024(RGB)*600 display resolution(dual or cascade) (default) RES[1:0] = "10", for 800(RGB)*600 display resolution(dual or cascade) (601~936 channel disable) RES[1:0] = "11", for 800(RGB)*480 display resolution(dual or cascade) (601~936 channel disable)
BIST	R1[3]	Normal Operation/BIST pattern select. BIST = H : BIST(DCLK input is not needed) BIST = L : Normal Operation (Default)
DITHER	R1[4]	Dithering function enable control. DITHER = "1", Enable internal dithering function DITHER = "0", Disable internal dithering function (Default)
HFRC	R1[5]	H-FRC selection. HFRC = H : H-FRC enable HFRC = L : FRC enable (Default) If DITHER="0",disable dithering function(H-FRC and FRC disable)
CABC_EN[1:0]	R1[7:6]	CABC H/W enable pin. Normally pull low. When CABC_EN="00", CABC OFF. (Default mode) When CABC_EN="01", User interface Image. When CABC_EN="10", Still Picture. When CABC_EN="11", Moving Image

R2: System Control Register:

Designation	Address	Description
		Reserved
NBW	R2[6]	Normally black or normally white setting. NBW="H": Normally black. NBW="L": Normally white(Default).
	R2[7]	Reserved

R3: Gate on sequence Controller Register:

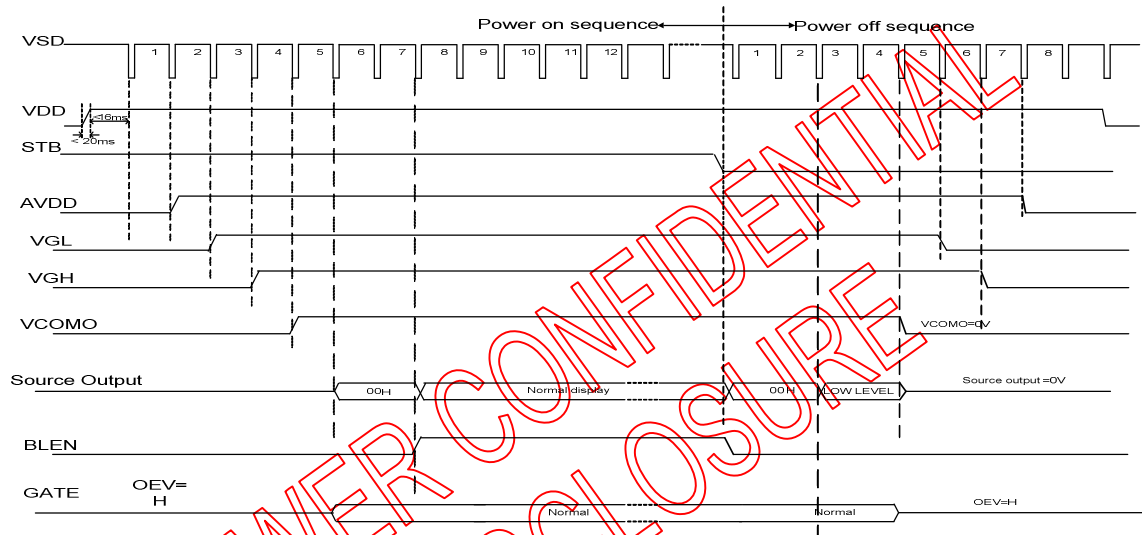
Designation	Address	Description															
SEL[1:0]	R3[1:0]	Gate on sequence select. <table border="1"> <thead> <tr> <th>SEL[0]</th><th>SEL[1]</th><th>Pin control function</th></tr> </thead> <tbody> <tr> <td>1</td><td>1</td><td>Z+P</td></tr> <tr> <td>1</td><td>0</td><td>P</td></tr> <tr> <td>0</td><td>1</td><td>S</td></tr> <tr> <td>0</td><td>0</td><td>Z(default)</td></tr> </tbody> </table>	SEL[0]	SEL[1]	Pin control function	1	1	Z+P	1	0	P	0	1	S	0	0	Z(default)
SEL[0]	SEL[1]	Pin control function															
1	1	Z+P															
1	0	P															
0	1	S															
0	0	Z(default)															
FRAME	R3[2]	Frame inverse or not select. FRAME = "1", Uniform FRAME = "0", Frame inverse(Default)															
		Reserved															

6. FUNCTION DESCRIPTION

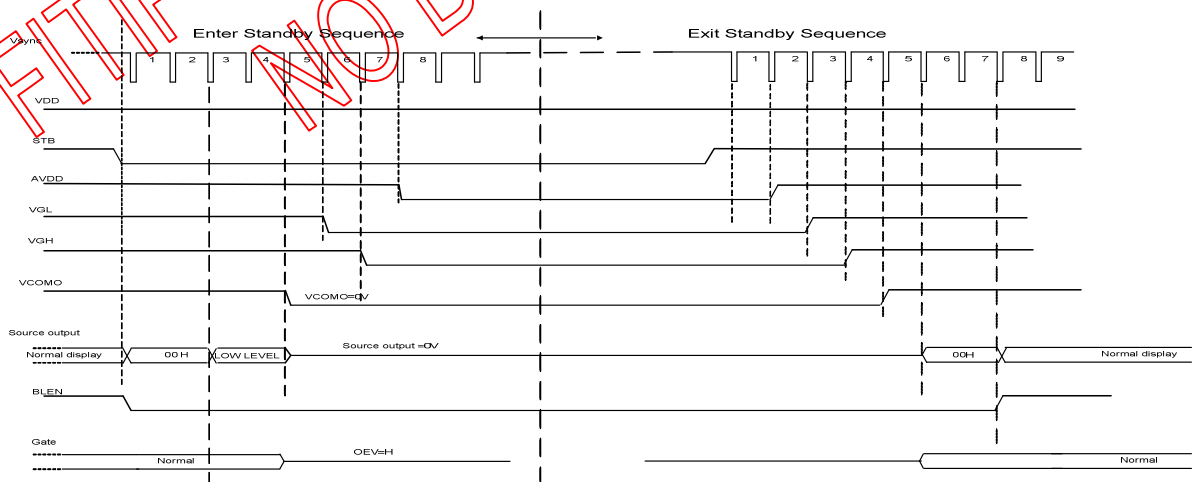
6.1. Power On/Off Sequence

In order to prevent IC from power on reset fail, the rising time (TPOR) of the digital power supply VDD should be maintained within the given specifications. Refer to “AC Characteristics” for more detail on timing.

6.2. Power-On/Off Timing Sequence



Power On/Off timing chart



Enter and Exit Standby Mode timing chart

Note: Low level=3Fh,when NBW=L(Normally white)
Low level=00h,when NBW=H(Normally black)

6.3. Input Data VS Output Channels

6.3.1. DUAL="0"

SHLR="1", right shift

Output	SO1	SO2	SO3	-	SO1534	SO1535	SO1536
Order	First data			→	Last data		
Odd Line	D07~D00	D17~D10	D27~D20	---	D07~D00	D17~D10	D27~D20
Even Line	D07~D00	D17~D10	D27~D20	---	D07~D00	D17~D10	D27~D20

SHLR="0", left shift

Output	SO1	SO2	SO3	---	SO1534	SO1535	SO1536
Order	Last data			←	First data		
Odd Line	D07~D00	D17~D10	D27~D20	---	D07~D00	D17~D10	D27~D20
Even Line	D07~D00	D17~D10	D27~D20	---	D07~D00	D17~D10	D27~D20

6.3.2. DUAL="1"

SHLR="1", right shift

Output	SO1	SO2	SO3	---	SO1534	SO1535	SO1536
Order	First data			→	Last data		
Odd Line/ Gn	D07~D00	D27~D20	D17~D10	---	D07~D00	D27~D20	D17~D10
Odd Line/ Gn+1	D17~D10	D07~D00	D27~D20	---	D17~D10	D07~D00	D27~D20
Even Line/ Gn	D07~D00	D27~D20	D17~D10	---	D07~D00	D27~D20	D17~D10
Even Line/ Gn+1	D17~D10	D07~D00	D27~D20	---	D17~D10	D07~D00	D27~D20

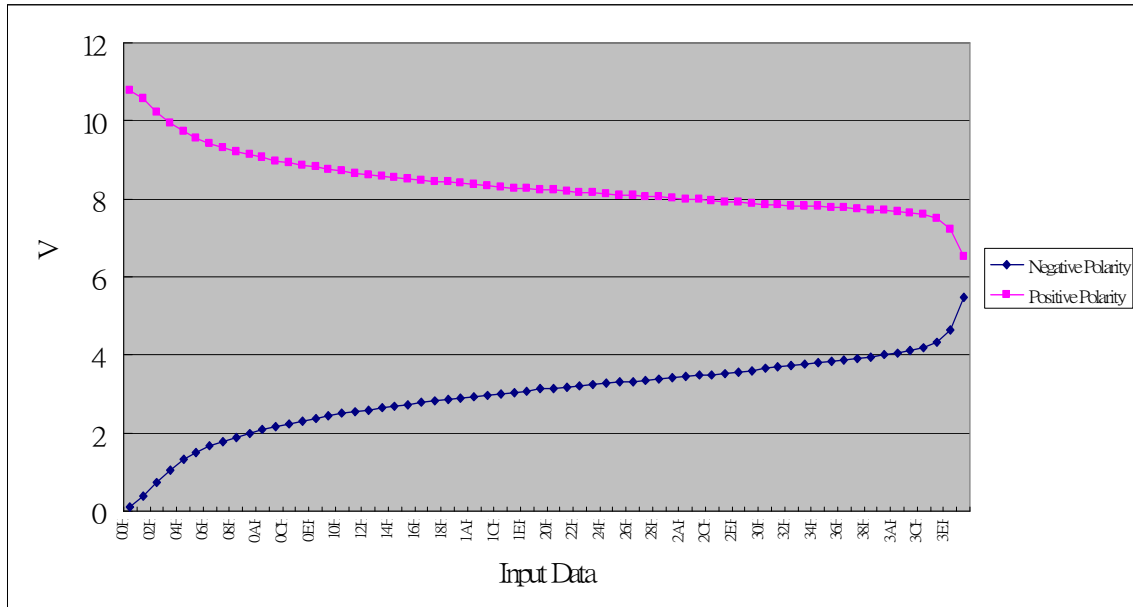
SHLR="0", left shift

Output	SO1	SO2	SO3	---	SO1534	SO1535	SO1536
Order	Last data			←	First data		
Odd Line/ Gn	D07~D00	D27~D20	D17~D10	---	D07~D00	D27~D20	D17~D10
Odd Line/ Gn+1	D17~D10	D07~D00	D27~D20	---	D17~D10	D07~D00	D27~D20
Even Line/ Gn	D07~D00	D27~D20	D17~D10	---	D07~D00	D27~D20	D17~D10
Even Line/ Gn+1	D17~D10	D07~D00	D27~D20	---	D17~D10	D07~D00	D27~D20

6.4. Input Data VS Output Voltage

The figure below shows the relationship between the input data and the output voltage. Refer to the following pages for the relative resistor values and voltage calculation method.

Gamma Tables vary for each customer.



Remark: AVDD-0.1 > V1 > V2 > V3 > V4 > V5 > V6 > V7; V8 > V9 > V10 > V11 > V12 > V13 > V14 > AGND+0.1V

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6.5. Input Data and Output Voltage Reference Table

Input Data and Output Voltage Reference Table

@AVDD=11V

V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	Unit
10.78	10.569	8.708	8.213	7.866	7.243	6.51	5.49	4.63	3.653	3.146	2.493	0.373	0.11	V

Data	Positive
00H	AVDD×0.980
01H	AVDD×0.961
02H	AVDD×0.930
03H	AVDD×0.905
04H	AVDD×0.885
05H	AVDD×0.870
06H	AVDD×0.857
07H	AVDD×0.847
08H	AVDD×0.838
09H	AVDD×0.830
0AH	AVDD×0.823
0BH	AVDD×0.816
0CH	AVDD×0.811
0DH	AVDD×0.806
0EH	AVDD×0.801
0FH	AVDD×0.796
10H	AVDD×0.792
11H	AVDD×0.788
12H	AVDD×0.784
13H	AVDD×0.781
14H	AVDD×0.778
15H	AVDD×0.775
16H	AVDD×0.772
17H	AVDD×0.769
18H	AVDD×0.766
19H	AVDD×0.763
1AH	AVDD×0.761
1BH	AVDD×0.758
1CH	AVDD×0.756
1DH	AVDD×0.753
1EH	AVDD×0.751
1FH	AVDD×0.748

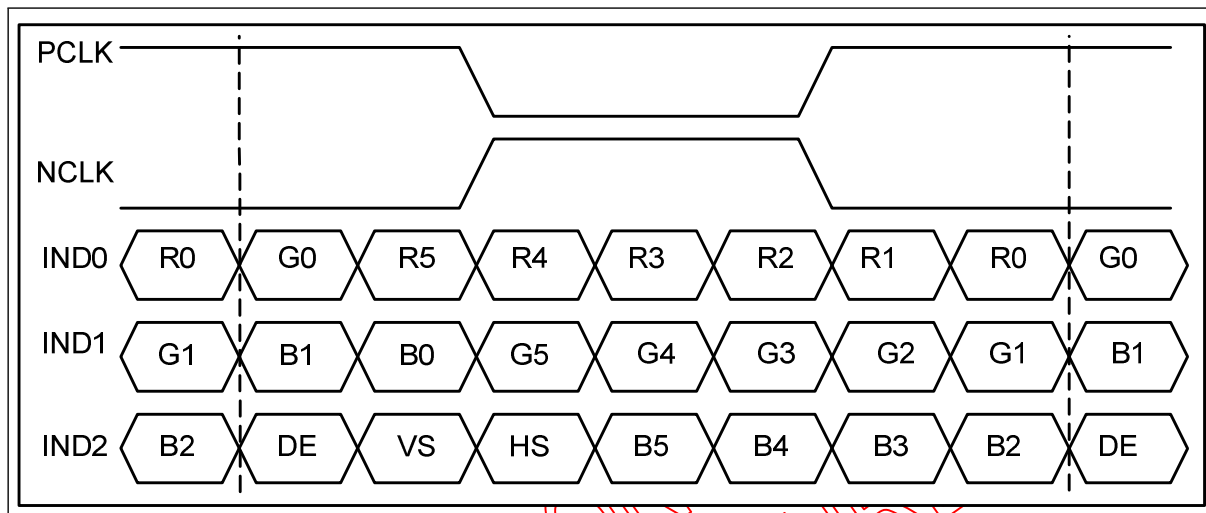
Data	Positive
20H	AVDD×0.747
21H	AVDD×0.745
22H	AVDD×0.743
23H	AVDD×0.741
24H	AVDD×0.739
25H	AVDD×0.737
26H	AVDD×0.735
27H	AVDD×0.732
28H	AVDD×0.731
29H	AVDD×0.729
2AH	AVDD×0.727
2BH	AVDD×0.725
2CH	AVDD×0.723
2DH	AVDD×0.721
2EH	AVDD×0.719
2FH	AVDD×0.717
30H	AVDD×0.715
31H	AVDD×0.713
32H	AVDD×0.711
33H	AVDD×0.710
34H	AVDD×0.709
35H	AVDD×0.707
36H	AVDD×0.706
37H	AVDD×0.704
38H	AVDD×0.702
39H	AVDD×0.700
3AH	AVDD×0.697
3BH	AVDD×0.694
3CH	AVDD×0.690
3DH	AVDD×0.681
3EH	AVDD×0.658
3FH	AVDD×0.592

Data	Negative
00H	AVDD×0.010
01H	AVDD×0.034
02H	AVDD×0.068
03H	AVDD×0.096
04H	AVDD×0.119
05H	AVDD×0.136
06H	AVDD×0.151
07H	AVDD×0.162
08H	AVDD×0.172
09H	AVDD×0.182
0AH	AVDD×0.189
0BH	AVDD×0.197
0CH	AVDD×0.204
0DH	AVDD×0.210
0EH	AVDD×0.215
0FH	AVDD×0.221
10H	AVDD×0.227
11H	AVDD×0.231
12H	AVDD×0.236
13H	AVDD×0.240
14H	AVDD×0.245
15H	AVDD×0.248
16H	AVDD×0.253
17H	AVDD×0.256
18H	AVDD×0.260
19H	AVDD×0.263
1AH	AVDD×0.266
1BH	AVDD×0.270
1CH	AVDD×0.273
1DH	AVDD×0.277
1EH	AVDD×0.280
1FH	AVDD×0.284

Data	Negative
20H	AVDD×0.286
21H	AVDD×0.289
22H	AVDD×0.292
23H	AVDD×0.294
24H	AVDD×0.297
25H	AVDD×0.300
26H	AVDD×0.302
27H	AVDD×0.305
28H	AVDD×0.308
29H	AVDD×0.311
2AH	AVDD×0.314
2BH	AVDD×0.316
2CH	AVDD×0.318
2DH	AVDD×0.321
2EH	AVDD×0.325
2FH	AVDD×0.328
30H	AVDD×0.332
31H	AVDD×0.336
32H	AVDD×0.339
33H	AVDD×0.342
34H	AVDD×0.345
35H	AVDD×0.348
36H	AVDD×0.351
37H	AVDD×0.355
38H	AVDD×0.359
39H	AVDD×0.364
3AH	AVDD×0.369
3BH	AVDD×0.375
3CH	AVDD×0.382
3DH	AVDD×0.394
3EH	AVDD×0.421
3FH	AVDD×0.499

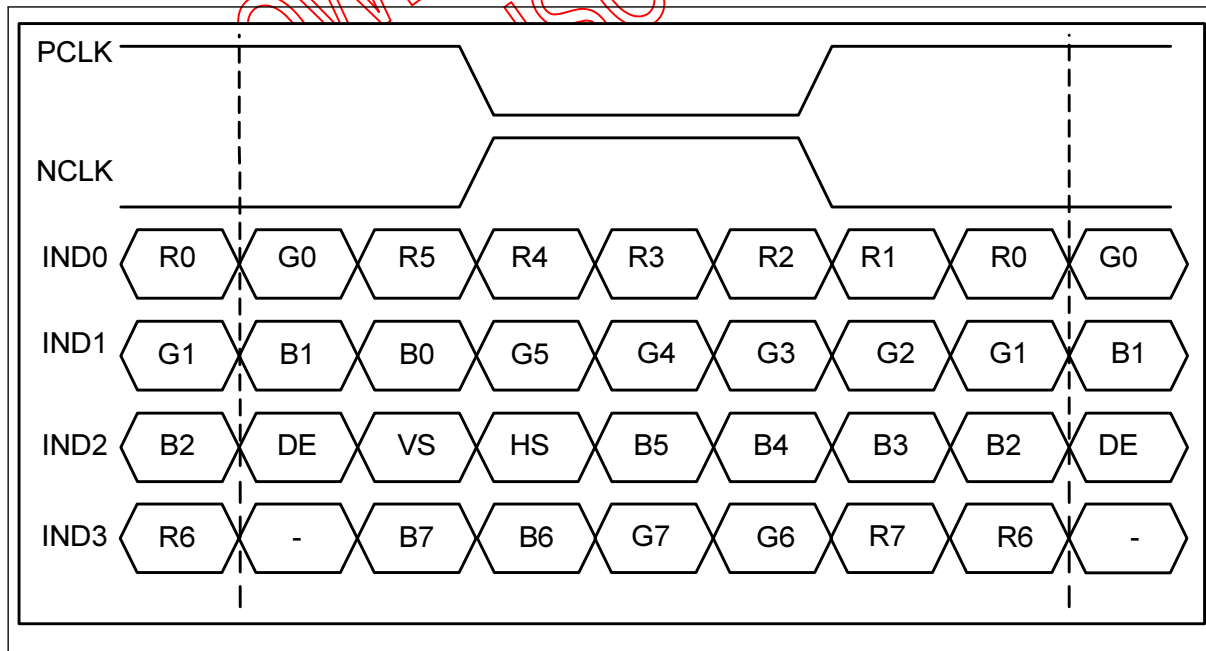
6.6. Data Input Format for LVDS

6.6.1. 6-bit LVDS input(HSD="H")



6-bit LVDS Input Timing chart

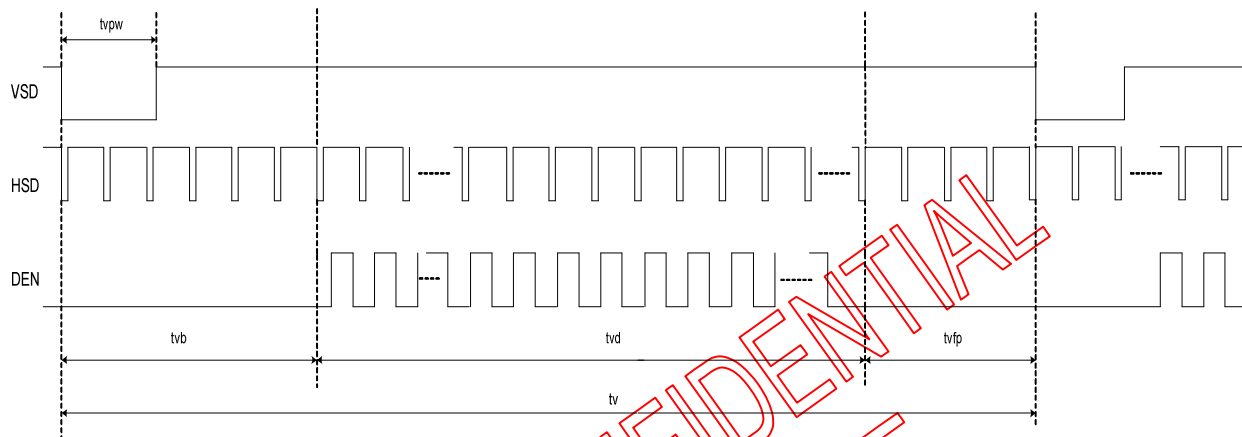
6.6.2. 8-bit LVDS input(HSD="L")



8-bit LVDS Input Timing chart

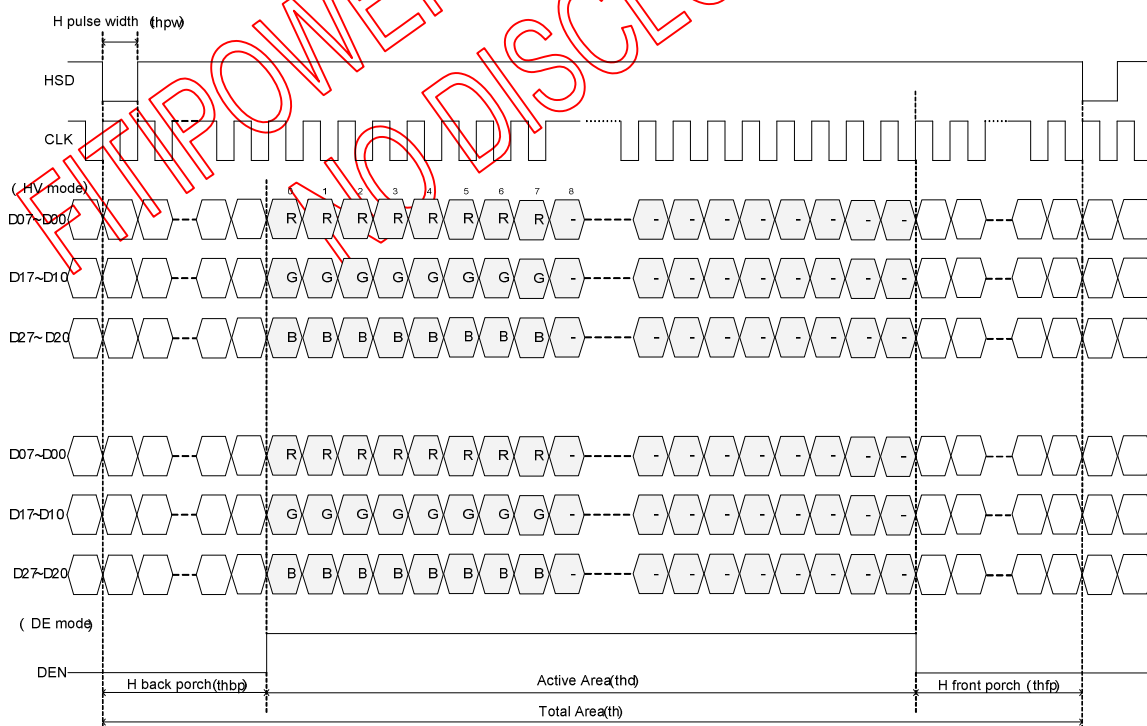
6.7. Data Input Format for TTL

6.7.1. Vertical input timing



Vertical input timing

6.7.2. Horizontal input timing



Horizontal input timing

6.8. Parallel RGB Timing Characteristic
6.8.1. For 1024RGB x 768 panel

DE mode

DE mode					
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency @Frame rate=60hz	fclk	52	65	71	Mhz
Horizontal display area	thd	1024			DCLK
HSYNC period time	th	1114	1344	1400	DCLK
HSYNC blanking	thbp+thfp	90	320	376	DCLK
Vertical display area	tvd	768			H
VSYNC period time	tv	778	806	845	H
VSYNC blanking	tvb+tvfp	10	38	77	H

HV mode(1)

HV mode						
Horizontal input timing						
Parameter		Symbol	Value			Unit
Horizontal display area		thd	1024			DCLK
DCLK frequency@ Frame rate=60hz		fclk	Min.	Typ.	Max.	
			57	65	70.5	Mhz
1 Horizontal Line		th	1200	1344	1400	DCLK
HSYNC pulse width	Min.	thpw	1			
	Typ.		—			
	Max.		140			
HSYNC back porch		thbp	160	160	160	
HSYNC front porch		thfp	16	160	216	

HV mode(2)

Vertical input timing					
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Vertical display area	tvd	768			H
VSYNC period time	tv	792	806	840	H
VSYNC pulse width	tvpw	1	—	20	H
VSYNC back porch	tvb	23	23	23	H
VSYNC front porch	tvfp	1	15	49	H

6.8.2. For 1024RGB x 600 panel

DE mode

DE mode					
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency @Frame rate=60hz	fclk	40.8	51.2	67.2	Mhz
Horizontal display area	thd	1024			DCLK
HSYNC period time	th	1114	1344	1400	DCLK
HSYNC blanking	thb+thfp	90	320	376	DCLK
Vertical display area	tvd	600			H
VSYNC period time	tv	610	635	800	H
VSYNC blanking	tvb+tvfp	10	85	200	H

HV mode(1)

HV mode						
Horizontal input timing						
Parameter		Symbol	Value			Unit
Horizontal display area		thd	1024			DCLK
DCLK frequency@ Frame rate=60hz		fclk	Min.	Typ.	Max.	
			44.9	51.2	63	Mhz
1 Horizontal Line		th	1200	1344	1400	DCLK
HSYNC pulse width	Min.	thpw	1			
	Typ.		—			
	Max.		140			
HSYNC back porch		thbp	160	160	160	
HSYNC front porch		thfp	16	160	216	

HV mode(2)

Vertical input timing					
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Vertical display area	tvd	600			H
VSYNC period time	tv	624	635	750	H
VSYNC pulse width	tvpw	1	—	20	H
VSYNC back porch	tvb	23	23	23	H
VSYNC front porch	tvfp	1	12	127	H

6.8.3. For 800RGB x 600 panel

DE mode

DE mode					
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency @Frame rate=60hz	fclk	32.6	39.6	62.4	Mhz
Horizontal display area	thd	800			DCLK
HSYNC period time	th	890	1000	1300	DCLK
HSYNC blanking	thb+thfp	90	200	500	DCLK
Vertical display area	tvd	600			H
VSYNC period time	tv	610	660	800	H
VSYNC blanking	tvb+tvfp	10	60	200	H

HV mode(1)

HV mode						
Horizontal input timing						
Parameter		Symbol	Value			Unit
Horizontal display area		thd	800			DCLK
DCLK frequency@ Frame rate=60hz		fclk	Min.	Typ.	Max.	
			34.5	39.6	50.4	Mhz
1 Horizontal Line		th	900	1000	1200	DCLK
HSYNC pulse width	Min.	thpw	1			
	Typ.		—			
	Max.		40			
HSYNC back porch		thbp	88	88	88	
HSYNC front porch		thfp	12	112	312	

HV mode(2)

Vertical input timing					
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Vertical display area	tvd	600			H
VSYNC period time	tv	640	660	700	H
VSYNC pulse width	tvpw	1	—	20	H
VSYNC back porch	tvb	39	39	39	H
VSYNC front porch	tvfp	1	21	61	H

6.8.4. For 800RGB x 480 panel

DE mode

DE mode					
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency @Frame rate=60hz	fclk	26.2	29.2	54.6	Mhz
Horizontal display area	thd	800			DCLK
HSYNC period time	th	890	928	1300	DCLK
HSYNC blanking	thb+thfp	90	128	500	DCLK
Vertical display area	tvd	480			H
VSYNC period time	tv	490	525	700	H
VSYNC blanking	tvb+tvfp	10	45	220	H

HV mode(1)

HV mode						
Horizontal input timing						
Parameter		Symbol	Value			Unit
Horizontal display area		thd	800			DCLK
DCLK frequency@ Frame rate=60hz		fclk	Min.	Typ.	Max.	Mhz
			27.7	29.2	39.6	
1 Horizontal Line		th	900	928	1100	DCLK
HSYNC pulse width	Min.	thpw	1			
	Typ.		—			
	Max.		40			
HSYNC back porch		thbp	88	88	88	
HSYNC front porch		thfp	12	40	212	

HV mode(2)

Vertical input timing					
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Vertical display area	tvd	480			H
VSYNC period time	tv	513	525	600	H
VSYNC pulse width	tvpw	1	—	3	H
VSYNC back porch	tvb	32	32	32	H
VSYNC front porch	tvfp	1	13	88	H

7. ELECTRICAL SPECIFICATION

7.1. Absolute Maximum Ratings

VOLTAGE (TA = 25°C, GND = AGND = GND_LVDS = 0V)

	Min.	Max.	Unit
Digital Supply Voltage, VDD	-0.5	+5.0	V
Analog Supply Voltage, AVDD, V1~V14	-0.5	+15.0	V

TEMPERATURE

	Min.	Max.	Unit
Operating temperature	-20	+85	°C
Storage temperature	-55	+125	°C

Comments

Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only. Functional operation of this device at these or any other conditions above those indicated in the operational sections of this specification is not implied and exposed to absolute maximum rating conditions for extended periods may affect device reliability.

7.2. Recommended Operating Range

Recommended Operating Range (TA = -20 to 85°C, GND = AGND = GND_LVDS = 0V)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Digital supply voltage	VDD	2.3	3.3	3.6	V
Analog supply voltage	AVDD	8	-	13.5	V
Digital input voltage	VIN	0	-	VDD	V

7.3. DC Electrical Characteristics

DC Characteristics

(TA = -20 to 85°C, VDD = 2.3 to 3.6V, AVDD = 8 to 13.5V, GND = AGND = GND_LVDS = 0V)

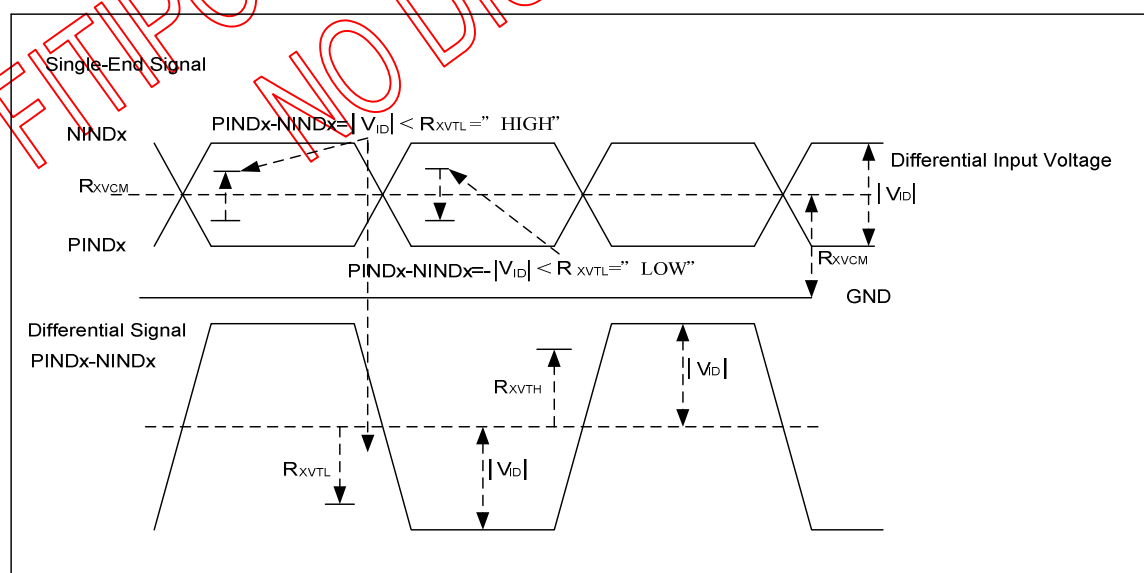
7.3.1. TTL mode

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Low level input voltage	Vil	For the digital circuit	0	-	0.3×VDD	V
High level input voltage	Vih	For the digital circuit	0.7×VDD	-	VDD	V
Input leakage current	Ii	For the digital circuit	-	-	±1	μA
High level output voltage	Voh	Ioh= -400 μA	VDD-0.4	-	-	V
Low level output voltage	Vol	Iol= +400 μA	-	-	GND+0.4	V
Pull low/high resistor	Ri	For the digital input pin @ VDD=3.3V	200K	250K	300K	ohm
Digital Operation current	Idd	Fclk=65 MHz, FLB=50KHz, VDD=3.3V	-	15	25	mA
Digital Stand-by current	Ist1	Clock and all functions are stopped	-	10	50	μA
Analog Operating Current	Idda	No load, Fclk=65MHz, FLB=50KHz @ AVDD=10V, V1=8V, V14=0.4V	-	10	12	mA
Analog Stand-by current	Ist2	No load, Clock and all functions are Stopped	-	10	50	μA
Input level of V1 ~ V7	Vref1	Gamma correction voltage input	0.4*AVDD	-	AVDD-0.1	V
Input level of V8 ~ V14	Vref2	Gamma correction voltage input	0.1	-	0.6*AVDD	V
Output Voltage deviation	Vod1	Vo = AVSS+0.1V ~ AVSS+0.5V and Vo = AVDD-0.5V ~ AVDD-0.1V	-	±20	±35	mV
Output Voltage deviation	Vod2	Vo = AVSS+0.5V ~ AVDD-0.5V	-	±15	±20	mV
Output Voltage Offset between Chips	Voc	Vo = AVSS+0.5V ~ AVDD-0.5V	-	-	±20	mV
Dynamic Range of Output	Vdr	SO1 ~ SO1536	0.1	-	AVDD-0.1	V
Sinking Current of Outputs	IOLy	SO1 ~ SO1536; Vo=0.1V v.s 1.0V , AVDD=13.5V	80	-	-	uA
Driving Current of Outputs	IOHy	SO1 ~ SO1536; Vo=13.4V v.s 12.5V , AVDD=13.5V	80	-	-	uA
Resistance of Gamma Table	Rg	Rn: Internal gamma resistor	0.7*Rn	1.0*Rn	1.3*Rn	ohm

7.3.2. LVDS mode(Receiver Differential :PIND0~PIND3,NIND0~NIND3,PINC,NINC)

LVDS DC characteristic

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Differential input high threshold voltage	RxVTH			+0.1V	V	RxVCM=1.2V
Differential input low threshold voltage	RxVTL	-0.1			V	
Input voltage range(single-end)	RxVIN	0		2.4	V	
Differential input common mode voltage	RxVCM	$ V_{ID} /2$		$2.4 - V_{ID} /2$	V	
Differential input voltage	$ V_{ID} $	0.2		0.6	V	
Differential input leakage current	RxVTH	-10		+10	μ A	
LVDS Digital Operating Current	Iddlvds	-	40(TBD)	50	mA	Fclk=65Mhz, VDD=3.3V
LVDS Digital Standby Current	Istlvds	-	10(TBD)	50	μ A	Clock & all functions are stop



LVDS DC Characteristic

7.3.3. Power
Power

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Base drive current for PWM	IDRV	–	–	60	mA	DRVA = 0.7V
DRV output voltage for PWM	VDRV	0	–	VDD	V	
Feedback voltage for PWM	VFB	1.1	1.2	1.3	V	
Duty cycle maximum	Dmax	–	–	85	%	
VCOM buffer input voltage	VCOMI	1	–	AVDD	V	
VCOM buffer output voltage	VCOMO	VCOMI-0.2	VCOMI	VCOMI+0.2	V	
VCOM buffer output current	IVCOM	–	–	10	mA	VCOMO= 5V vs 4.9V

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7.4. AC Electrical Characteristics

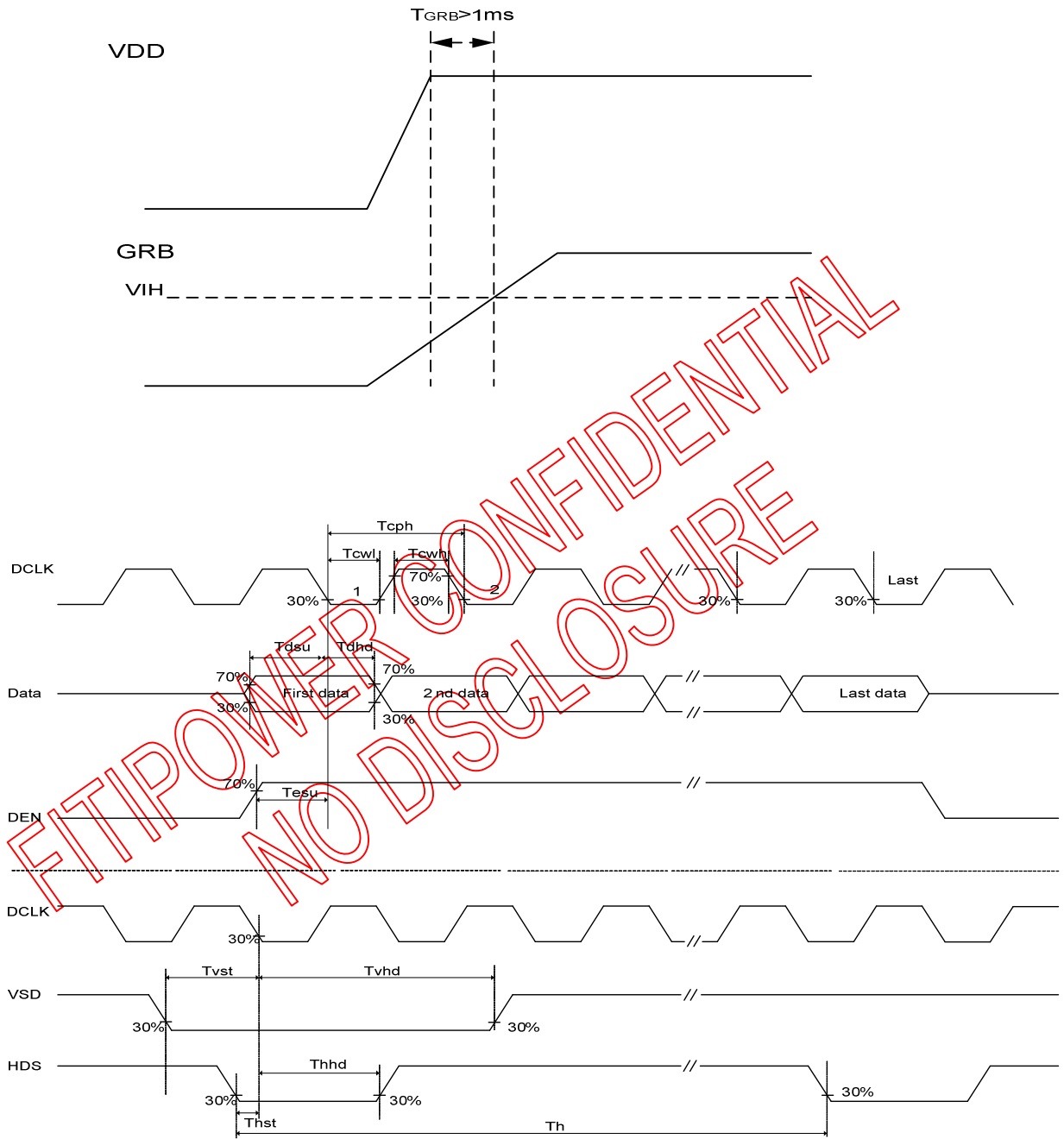
(TA = -20 to 85°C, VDD = 2.3 to 3.6V, AVDD = 8 to 13.5V, GND = AGND = 0V)

TTL mode

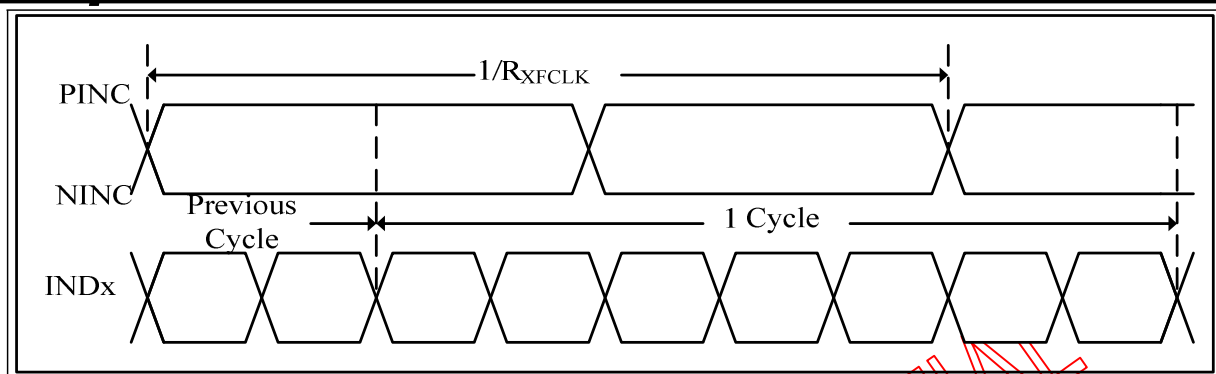
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
VDD Power On Slew rate	TPOR	From 0V to 90% VDD	-	-	20	ms
RSTB pulse width	TRST	DCLK = 65MHz	50	-	-	us
DCLK cycle time	Tcph	-	14	-	-	ns
DCLK pulse duty	Tcwh	-	40	50	60	%
VSD setup time	Tvst	-	5	-	-	ns
VSD hold time	Tvhd	-	5	-	-	ns
HSD setup time	Thst	-	5	-	-	ns
HSD hold time	Thhd	-	5	-	-	ns
Data set-up time	Tdsu	D0[7:0], D1[7:0], D2[7:0] to DCLK	5	-	-	ns
Data hold time	Tdhd	D0[7:0], D1[7:0], D2[7:0] to DCLK	5	-	-	ns
DE setup time	Tesu	-	5	-	-	ns
DE hold time	Tehd	-	5	-	-	ns
Output stable time	Tsst	10% to 90% target voltage. CL=90pF R=10K ohm(Cascade)	-	-	6	us
		Dual gate			3	

LVDS mode

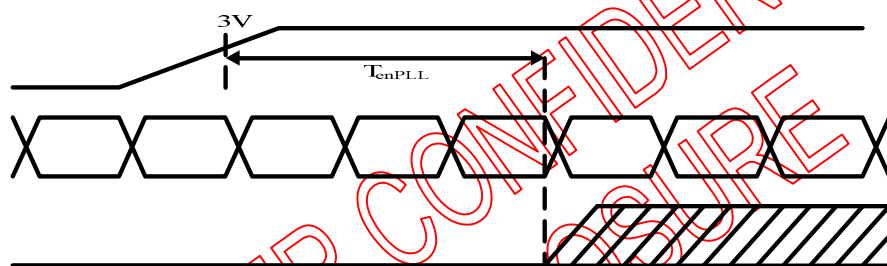
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Clock Frequency	RxFCLK		20	-	71	MHz
Input data skew margin	TRSKM	VID =400mV RxVCM=1.2V RxFCLK=71MHz	500			ps
Clock High Time	TLVCH			4/(7* RxFCLK)		ns
						ns
Clock Low Time	TLVCL			3/(7* RxFCLK)		ns
PLL wake-up-time	TenPLL				150	us



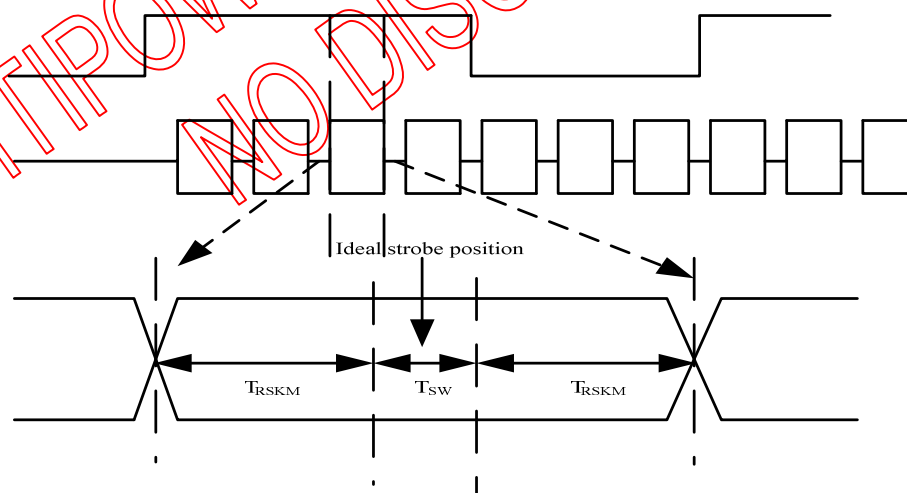
Parallel Input Clock and Data timing



LVDS timing(1)



LVDS timing(2)



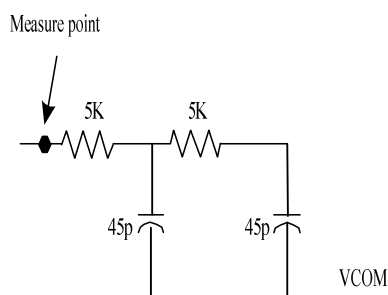
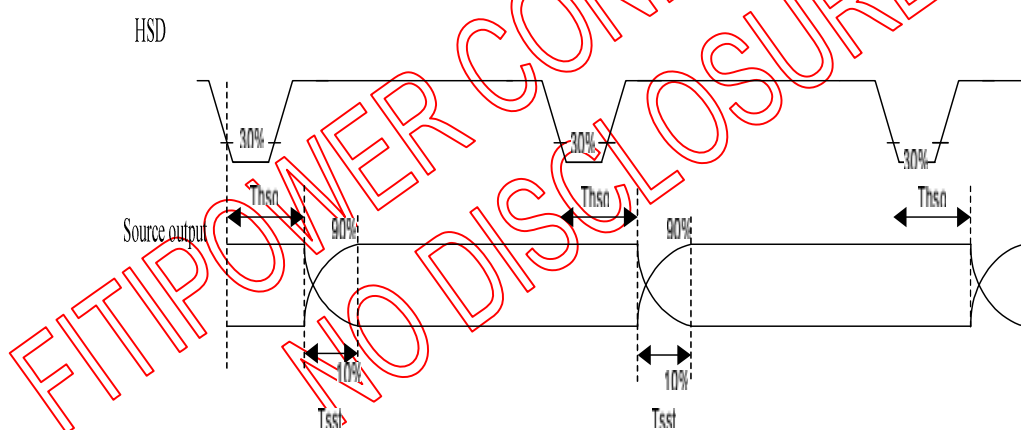
T_{sw} :Receiver strobe position
 T_{RSKM} :Receiver strobe margin

LVDS timing(3)

7.5. Output Timing Table

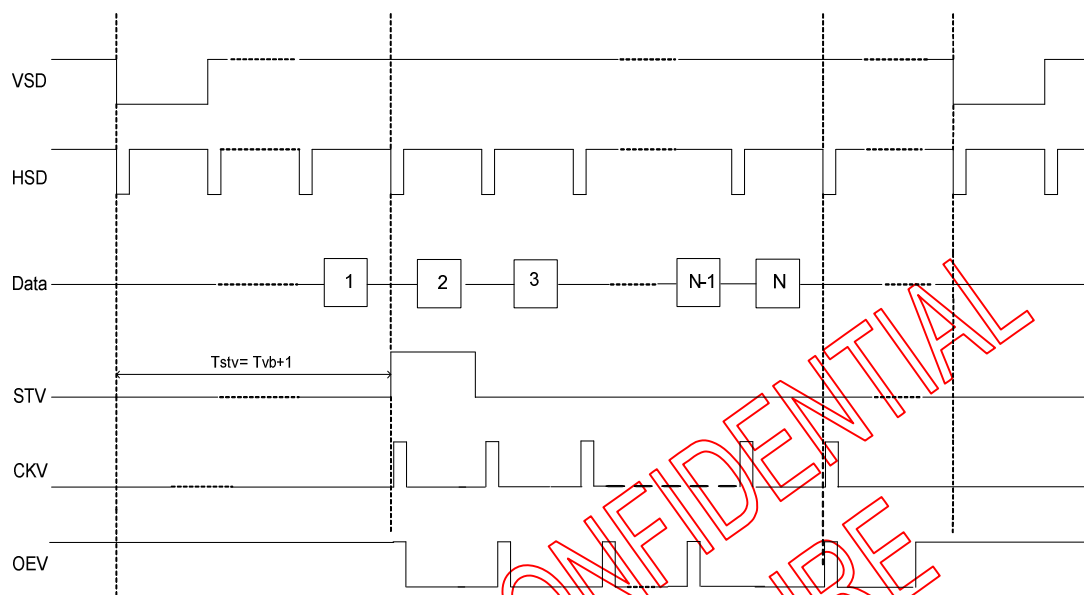
Output Timing Table

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
DCLK frequency	Fclk	-	65	71	MHz	VDD =2.3~3.6V
DCLK cycle time	Tclk	14.1	15.4	-	ns	
DCLK pulse duty	Tcwh	40	50	60	%	Tclk
Time from HSD to Source Output	Thso	-	64	-	DCLK	
Time from HSD to LD	Thld	-	64	-	DCLK	
Time from HSD to STV	Thstv	-	2	-	DCLK	
Time from HSD to CKV	Thckv	-	20	-	DCLK	
Time from HSD to OEV	Thoev	-	4	-	DCLK	
LD pulse width	Twld	-	10	-	DCLK	
CKV pulse width	Twckv	-	66	-	DCLK	
OEV pulse width	Twoev	-	74	-	DCLK	



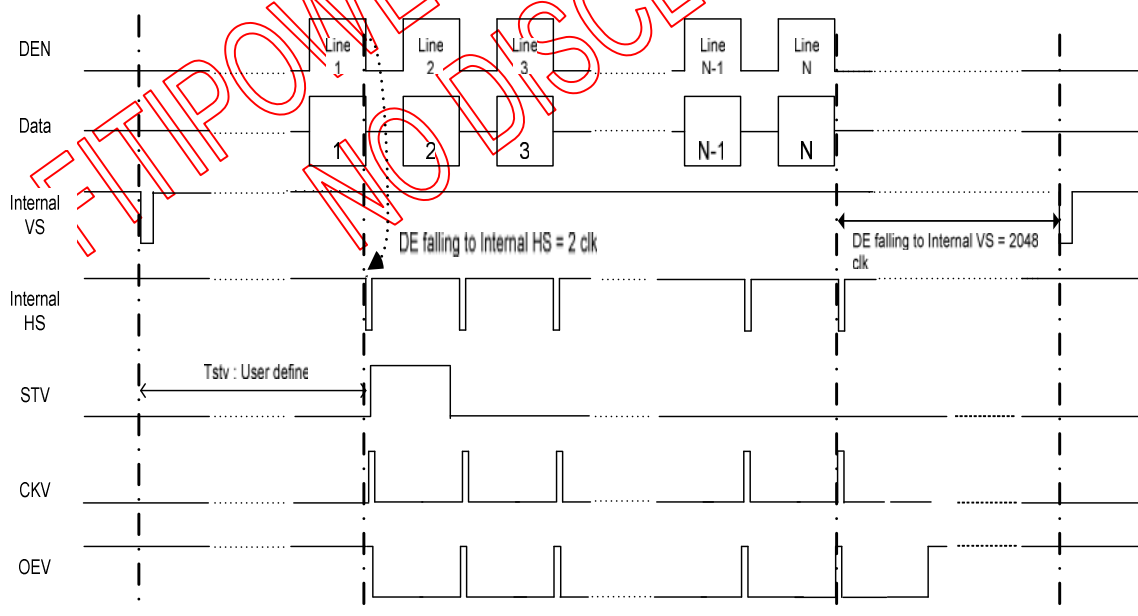
Source Output Timing(Cascade)

7.5.1. Vertical Timing Diagram HV mode(Cascade)



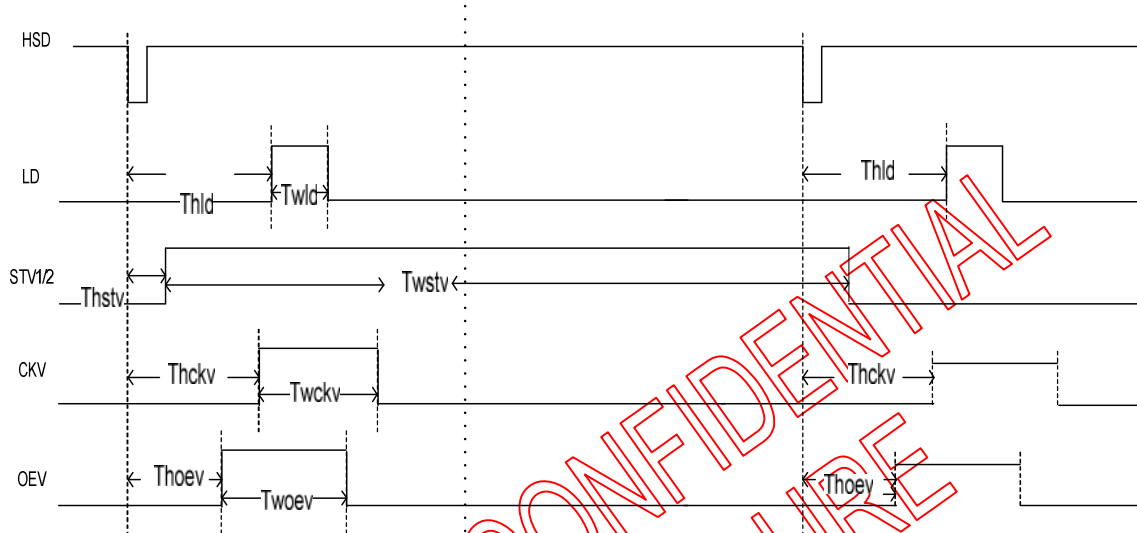
Vertical Timing Diagram HV mode(Cascade)

7.5.2. Vertical Timing Diagram DE mode(Cascade)



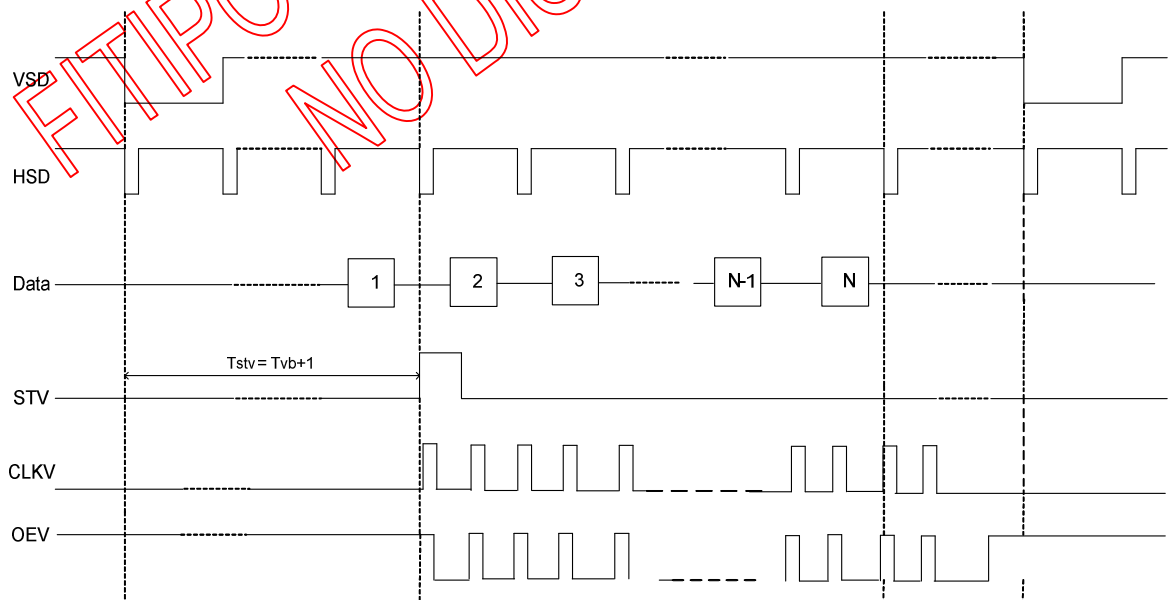
Vertical Timing Diagram DE mode(Cascade)

7.5.3. Gate output timing diagram(Cascade)



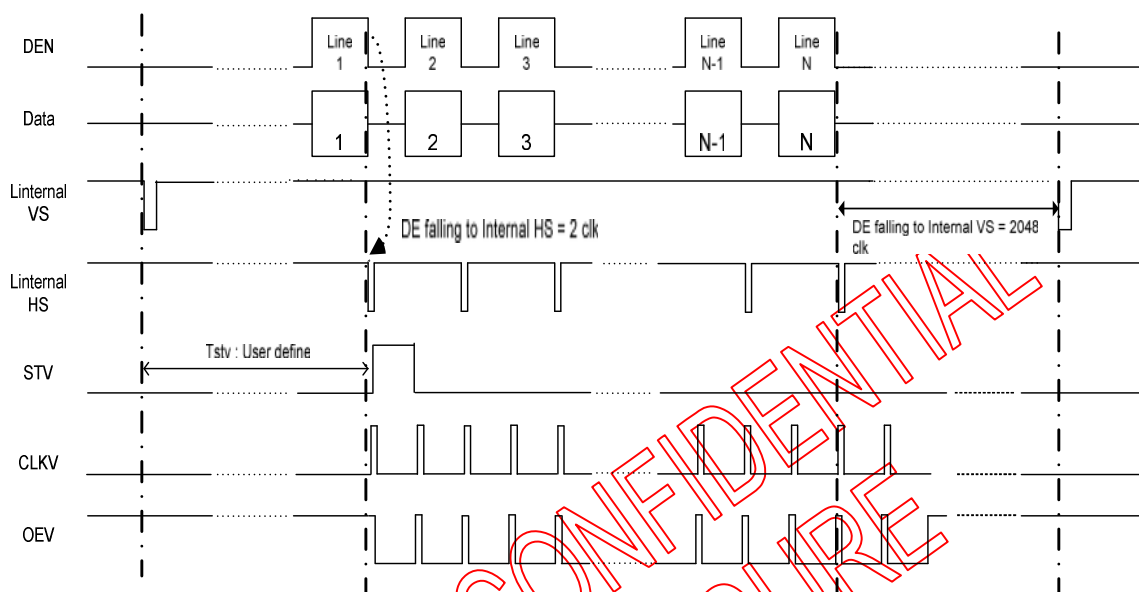
Gate output timing diagram(Cascade)

7.5.4. Vertical Timing Diagram HV mode(Dual Gate)



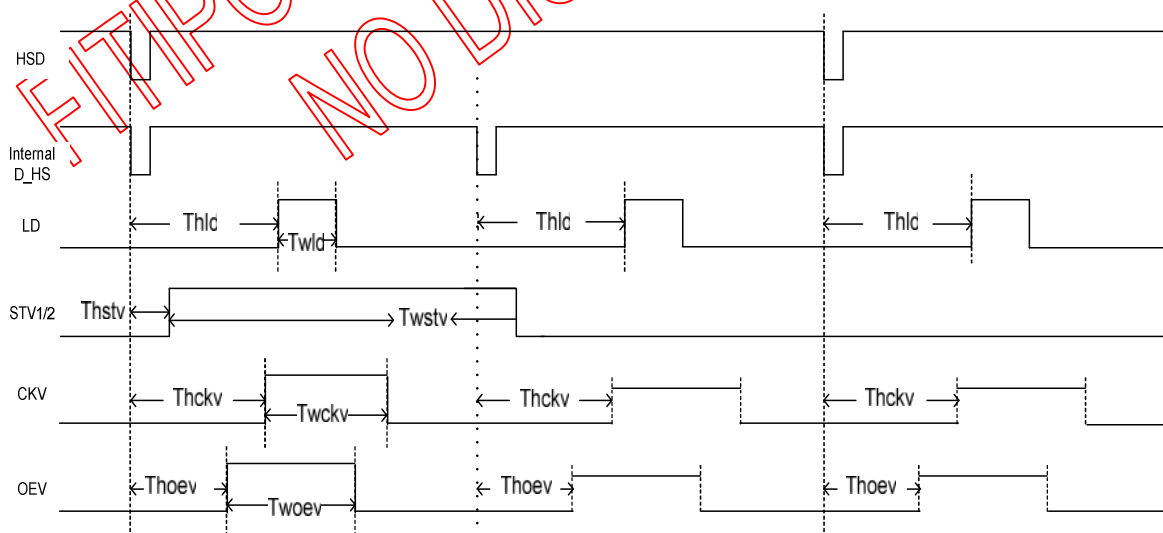
Vertical Timing Diagram HV mode(Dual Gate)

7.5.5. Vertical Timing Diagram DE mode(Dual Gate)



Vertical Timing Diagram DE mode(Dual Gate)

7.5.6. Gate output timing diagram(Dual Gate)

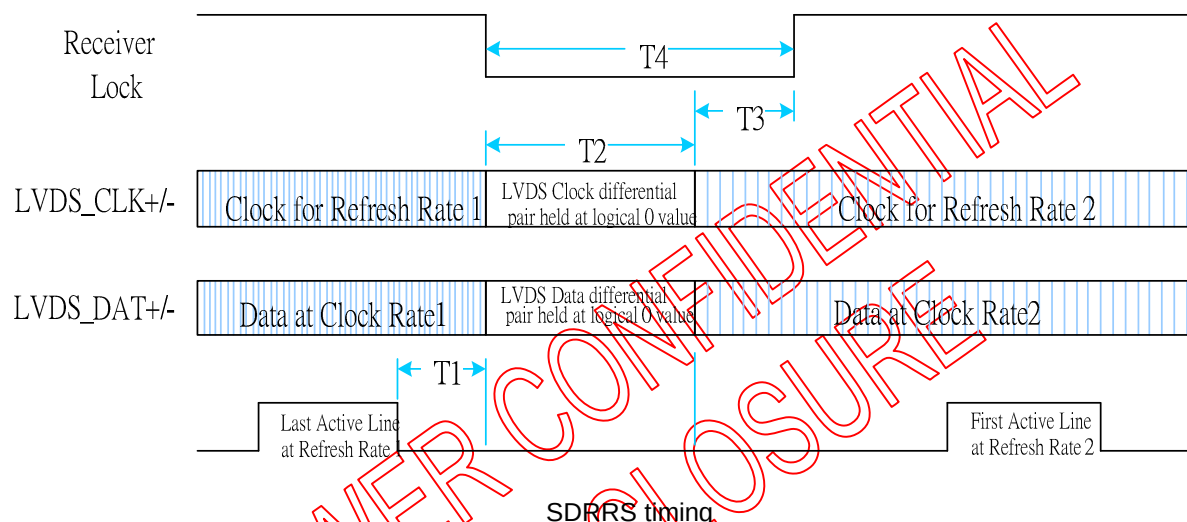


Gate output timing diagram(Dual Gate)

8. SDRRS TIMING DIAGRAM

SDRRS(seamless display refresh rate switching)

When Showing the still picture.it is accept to refresh rate from 60Hz to low refresh rate (for example 40Hz).The purpose is mainly for power saving. INTEL defined a timing chart switch between different refresh rate.Following this timing chart,the switch between different refresh rates is seamless for end user.



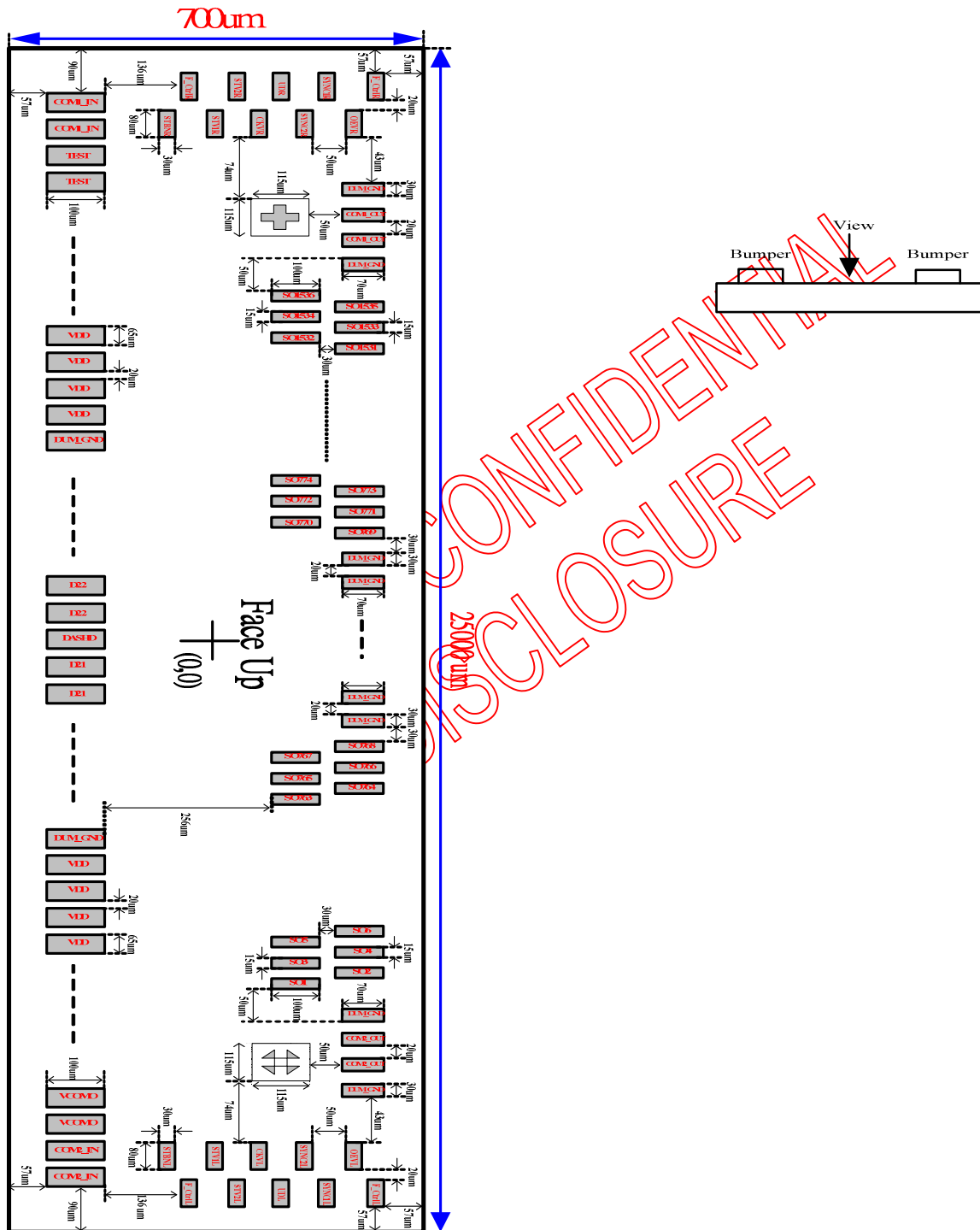
T1-Min delay from start of vertical blank to start of timing change:2 lines(HSYNC periods)

T2-Max delay for clock to transition to new frequency:100us

T3-Max receiver lock delay from stable clock: Display specific

T4-Max period during which panel maintains display(T2+T3): Display specific

9. CHIP OUTLINE DIMENSIONS



Chip Outline Dimensions

Figure 1 consists of two diagrams. The left diagram shows a cross shape with a width dimension of 115 and a height dimension of 100. The right diagram shows a square with a width dimension of 115 and a height dimension of 100, with a smaller square inside it.

9.2. Pad Coordinate

[illegible]

126	D21	-1752.5	-243
127	D20	-1667.5	-243
128	DASHD	-1582.5	-243
129	DCLK	-1497.5	-243
130	NINC	-1412.5	-243
131	DASHD	-1327.5	-243
132	VDD_LVDS	-1242.5	-243
133	VDD_LVDS	-1157.5	-243
134	VDD_LVDS	-1072.5	-243
135	VDD_LVDS	-987.5	-243
136	REV	-902.5	-243
137	DASHD	-817.5	-243
138	D17	-732.5	-243
139	D16	-647.5	-243
140	DASHD	-562.5	-243
141	D15	-477.5	-243
142	D14	-392.5	-243
143	DASHD	-307.5	-243
144	D13	-222.5	-243
145	D12	-137.5	-243
146	DASHD	-52.5	-243
147	D11	32.5	-243
148	D10	117.5	-243
149	DASHD	202.5	-243
150	D07	287.5	-243
151	D06	372.5	-243
152	DASHD	457.5	-243
153	D05	542.5	-243
154	D04	627.5	-243
155	DASHD	712.5	-243
156	D03	797.5	-243
157	D02	882.5	-243
158	DASHD	967.5	-243
159	D01	1052.5	-243
160	D00	1137.5	-243
161	DASHD	1222.5	-243
162	SHIELDING	1307.5	-243
163	GAML	1392.5	-243
164	GAML	1477.5	-243
165	V8	1562.5	-243
166	V8	1647.5	-243
167	V9	1732.5	-243
168	V9	1817.5	-243
169	V10	1902.5	-243
170	V10	1987.5	-243
171	V11	2072.5	-243
172	V11	2157.5	-243
173	V12	2242.5	-243
174	V12	2327.5	-243
175	V13	2412.5	-243
176	V13	2497.5	-243
177	V14	2582.5	-243
178	V14	2667.5	-243
179	SHIELDING	2752.5	-243
180	AGND	2837.5	-243
181	AGND	2922.5	-243
182	AGND	3007.5	-243
183	AGND	3092.5	-243
184	SHIELDING	3177.5	-243
185	AVDD	3262.5	-243
186	AVDD	3347.5	-243
187	AVDD	3432.5	-243
188	AVDD	3517.5	-243
189	SHIELDING	3602.5	-243
190	GND	3687.5	-243
191	GND	3772.5	-243

192	GND	3857.5	-243
193	GND	3942.5	-243
194	SHIELDING	4027.5	-243
195	VDD	4112.5	-243
196	VDD	4197.5	-243
197	VDD	4282.5	-243
198	VDD	4367.5	-243
199	SHIELDING	4452.5	-243
200	DUAL	4537.5	-243
201	DUAL	4622.5	-243
202	MASL	4707.5	-243
203	MASL	4792.5	-243
204	MASLOC	4877.5	-243
205	MASLOC	4962.5	-243
206	CABC_EN[0]	5047.5	-243
207	CABC_EN[0]	5132.5	-243
208	CABC_EN[1]	5217.5	-243
209	CABC_EN[1]	5302.5	-243
210	OPDRV	5387.5	-243
211	OPDRV	5472.5	-243
212	MODE	5557.5	-243
213	MODE	5642.5	-243
214	IFSEL	5727.5	-243
215	IFSEL	5812.5	-243
216	BIST	5897.5	-243
217	BIST	5982.5	-243
218	RES[0]	6067.5	-243
219	RES[0]	6152.5	-243
220	RES[1]	6237.5	-243
221	RES[1]	6322.5	-243
222	DCLKPOL	6407.5	-243
223	DCLKPOL	6492.5	-243
224	STBYB	6577.5	-243
225	STBYB	6662.5	-243
226	GRB	6747.5	-243
227	GRB	6832.5	-243
228	SHLR	6917.5	-243
229	SHLR	7002.5	-243
230	UPDN	7087.5	-243
231	UPDN	7172.5	-243
232	SHIELDING	7257.5	-243
233	TP	7342.5	-243
234	TP	7427.5	-243
235	TP	7512.5	-243
236	TP	7597.5	-243
237	TP	7682.5	-243
238	TP	7767.5	-243
239	TP	7852.5	-243
240	TP	7937.5	-243
241	TP	8022.5	-243
242	TP	8107.5	-243
243	TP	8192.5	-243
244	TP	8277.5	-243
245	TP	8362.5	-243
246	TP	8447.5	-243
247	SHIELDING	8532.5	-243
248	VDD	8617.5	-243
249	VDD	8702.5	-243
250	VDD	8787.5	-243
251	VDD	8872.5	-243
252	SHIELDING	8957.5	-243
253	GND	9042.5	-243
254	GND	9127.5	-243
255	GND	9212.5	-243
256	GND	9297.5	-243
257	SHIELDING	9382.5	-243

258	AVDD	9467.5	-243
259	AVDD	9552.5	-243
260	AVDD	9637.5	-243
261	AVDD	9722.5	-243
262	SHIELDING	9807.5	-243
263	AGND	9892.5	-243
264	AGND	9977.5	-243
265	AGND	10062.5	-243
266	AGND	10147.5	-243
267	SHIELDING	10232.5	-243
268	TP	10317.5	-243
269	VCOMI	10402.5	-243
270	VCOMI	10487.5	-243
271	PWR_EN	10572.5	-243
272	PWR_EN	10657.5	-243
273	FBL	10742.5	-243
274	FBL	10827.5	-243
275	FBH	10912.5	-243
276	FBH	10997.5	-243
277	FBA	11082.5	-243
278	FBA	11167.5	-243
279	AVDDG	11252.5	-243
280	AVDDG	11337.5	-243
281	DRVA	11422.5	-243
282	DRVA	11507.5	-243
283	DRVH	11592.5	-243
284	DRVH	11677.5	-243
285	DRVL	11762.5	-243
286	DRVL	11847.5	-243
287	DRVL_B	11932.5	-243
288	DRVL_B	12017.5	-243
289	VCOMO	12102.5	-243
290	VCOMO	12187.5	-243
291	COM2_IN	12272.5	-243
292	COM2_IN	12357.5	-243
293	STBNL	12303.0	-82
294	F_CtrlL	12403.0	-42
295	STV2L	12303.0	-2
296	STV1L	12403.0	38
297	CKVL	12303.0	78
298	UDL	12403.0	118
299	SYNC2L	12303.0	158
300	SYNC1L	12403.0	198
301	OEVL	12303.0	238
302	F_CtrlL	12403.0	278
303	SHIELDING	12205.0	258
304	COM2_OUT	12155.0	258
305	COM2_OUT	12105.0	258
306	SHIELDING	12055.0	258
307	SO1	12012.5	113
308	SO2	11997.5	243
309	SO3	11982.5	113
310	SO4	11967.5	243
311	SO5	11952.5	113
312	SO6	11937.5	243
313	SO7	11922.5	113
314	SO8	11907.5	243
315	SO9	11892.5	113
316	SO10	11877.5	243
317	SO11	11862.5	113
318	SO12	11847.5	243
319	SO13	11832.5	113
320	SO14	11817.5	243
321	SO15	11802.5	113
322	SO16	11787.5	243
323	SO17	11772.5	113

324	SO18	11757.5	243
325	SO19	11742.5	113
326	SO20	11727.5	243
327	SO21	11712.5	113
328	SO22	11697.5	243
329	SO23	11682.5	113
330	SO24	11667.5	243
331	SO25	11652.5	113
332	SO26	11637.5	243
333	SO27	11622.5	113
334	SO28	11607.5	243
335	SO29	11592.5	113
336	SO30	11577.5	243
337	SO31	11562.5	113
338	SO32	11547.5	243
339	SO33	11532.5	113
340	SO34	11517.5	243
341	SO35	11502.5	113
342	SO36	11487.5	243
343	SO37	11472.5	113
344	SO38	11457.5	243
345	SO39	11442.5	113
346	SO40	11427.5	243
347	SO41	11412.5	113
348	SO42	11397.5	243
349	SO43	11382.5	113
350	SO44	11367.5	243
351	SO45	11352.5	113
352	SO46	11337.5	243
353	SO47	11322.5	113
354	SO48	11307.5	243
355	SO49	11292.5	113
356	SO50	11277.5	243
357	SO51	11262.5	113
358	SO52	11247.5	243
359	SO53	11232.5	113
360	SO54	11217.5	243
361	SO55	11202.5	113
362	SO56	11187.5	243
363	SO57	11172.5	113
364	SO58	11157.5	243
365	SO59	11142.5	113
366	SO60	11127.5	243
367	SO61	11112.5	113
368	SO62	11097.5	243
369	SO63	11082.5	113
370	SO64	11067.5	243
371	SO65	11052.5	113
372	SO66	11037.5	243
373	SO67	11022.5	113
374	SO68	11007.5	243
375	SO69	10992.5	113
376	SO70	10977.5	243
377	SO71	10962.5	113
378	SO72	10947.5	243
379	SO73	10932.5	113
380	SO74	10917.5	243
381	SO75	10902.5	113
382	SO76	10887.5	243
383	SO77	10872.5	113
384	SO78	10857.5	243
385	SO79	10842.5	113
386	SO80	10827.5	243
387	SO81	10812.5	113
388	SO82	10797.5	243
389	SO83	10782.5	113
390	SO84	10767.5	243
391	SO85	10752.5	113
392	SO86	10737.5	243
393	SO87	10722.5	113
394	SO88	10707.5	243
395	SO89	10692.5	113
396	SO90	10677.5	243
397	SO91	10662.5	113
398	SO92	10647.5	243
399	SO93	10632.5	113
400	SO94	10617.5	243
401	SO95	10602.5	113
402	SO96	10587.5	243
403	SO97	10572.5	113
404	SO98	10557.5	243
405	SO99	10542.5	113
406	SO100	10527.5	243
407	SO101	10512.5	113
408	SO102	10497.5	243
409	SO103	10482.5	113
410	SO104	10467.5	243
411	SO105	10452.5	113
412	SO106	10437.5	243
413	SO107	10422.5	113
414	SO108	10407.5	243
415	SO109	10392.5	113
416	SO110	10377.5	243
417	SO111	10362.5	113
418	SO112	10347.5	243
419	SO113	10332.5	113
420	SO114	10317.5	243
421	SO115	10302.5	113
422	SO116	10287.5	243
423	SO117	10272.5	113
424	SO118	10257.5	243
425	SO119	10242.5	113
426	SO120	10227.5	243
427	SO121	10212.5	113
428	SO122	10197.5	243
429	SO123	10182.5	113
430	SO124	10167.5	243
431	SO125	10152.5	113
432	SO126	10137.5	243
433	SO127	10122.5	113
434	SO128	10107.5	243
435	SO129	10092.5	113
436	SO130	10077.5	243
437	SO131	10062.5	113
438	SO132	10047.5	243
439	SO133	10032.5	113
440	SO134	10017.5	243
441	SO135	10002.5	113
442	SO136	9987.5	243
443	SO137	9972.5	113
444	SO138	9957.5	243
445	SO139	9942.5	113
446	SO140	9927.5	243
447	SO141	9912.5	113
448	SO142	9897.5	243
449	SO143	9882.5	113
450	SO144	9867.5	243
451	SO145	9852.5	113
452	SO146	9837.5	243
453	SO147	9822.5	113
454	SO148	9807.5	243
455	SO149	9792.5	113
456	SO150	9777.5	243
457	SO151	9762.5	113
458	SO152	9747.5	243
459	SO153	9732.5	113
460	SO154	9717.5	243
461	SO155	9702.5	113
462	SO156	9687.5	243
463	SO157	9672.5	113
464	SO158	9657.5	243
465	SO159	9642.5	113
466	SO160	9627.5	243
467	SO161	9612.5	113
468	SO162	9597.5	243
469	SO163	9582.5	113
470	SO164	9567.5	243
471	SO165	9552.5	113
472	SO166	9537.5	243
473	SO167	9522.5	113
474	SO168	9507.5	243
475	SO169	9492.5	113
476	SO170	9477.5	243
477	SO171	9462.5	113
478	SO172	9447.5	243
479	SO173	9432.5	113
480	SO174	9417.5	243
481	SO175	9402.5	113
482	SO176	9387.5	243
483	SO177	9372.5	113
484	SO178	9357.5	243
485	SO179	9342.5	113
486	SO180	9327.5	243
487	SO181	9312.5	113
488	SO182	9297.5	243
489	SO183	9282.5	113
490	SO184	9267.5	243
491	SO185	9252.5	113
492	SO186	9237.5	243
493	SO187	9222.5	113
494	SO188	9207.5	243
495	SO189	9192.5	113
496	SO190	9177.5	243
497	SO191	9162.5	113
498	SO192	9147.5	243
499	SO193	9132.5	113
500	SO194	9117.5	243
501	SO195	9102.5	113
502	SO196	9087.5	243
503	SO197	9072.5	113
504	SO198	9057.5	243
505	SO199	9042.5	113
506	SO200	9027.5	243
507	SO201	9012.5	113
508	SO202	8997.5	243
509	SO203	8982.5	113
510	SO204	8967.5	243
511	SO205	8952.5	113
512	SO206	8937.5	243
513	SO207	8922.5	113
514	SO208	8907.5	243
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521	SO215	8802.5	113

522	SO216	8787.5	243
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524	SO218	8757.5	243
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526	SO220	8727.5	243
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536	SO230	8577.5	243
537	SO231	8562.5	113
538	SO232	8547.5	243
539	SO233	8532.5	113
540	SO234	8517.5	243
541	SO235	8502.5	113
542	SO236	8487.5	243
543	SO237	8472.5	113
544	SO238	8457.5	243
545	SO239	8442.5	113
546	SO240	8427.5	243
547	SO241	8412.5	113
548	SO242	8397.5	243
549	SO243	8382.5	113
550	SO244	8367.5	243
551	SO245	8352.5	113
552	SO246	8337.5	243
553	SO247	8322.5	113
554	SO248	8307.5	243
555	SO249	8292.5	113
556	SO250	8277.5	243
557	SO251	8262.5	113
558	SO252	8247.5	243
559	SO253	8232.5	113
560	SO254	8217.5	243
561	SO255	8202.5	113
562	SO256	8187.5	243
563	SO257	8172.5	113
564	SO258	8157.5	243
565	SO259	8142.5	113
566	SO260	8127.5	243
567	SO261	8112.5	113
568	SO262	8097.5	243
569	SO263	8082.5	113
570	SO264	8067.5	243
571	SO265	8052.5	113
572	SO266	8037.5	243
573	SO267	8022.5	113
574	SO268	8007.5	243
575	SO269	7992.5	113
576	SO270	7977.5	243
577	SO271	7962.5	113
578	SO272	7947.5	243
579	SO273	7932.5	113
580	SO274	7917.5	243
581	SO275	7902.5	113
582	SO276	7887.5	243
583	SO277	7872.5	113
584	SO278	7857.5	243
585	SO279	7842.5	113
586	SO280	7827.5	243
587	SO281	7812.5	113
588	SO282	7797.5	243
589	SO283	7782.5	113
590	SO284	7767.5	243
591	SO285	7752.5	113
592	SO286	7737.5	243
593	SO287	7722.5	113
594	SO288	7707.5	243
595	SO289	7692.5	113
596	SO290	7677.5	243
597	SO291	7662.5	113
598	SO292	7647.5	243
599	SO293	7632.5	113
600	SO294	7617.5	243
601	SO295	7602.5	113
602	SO296	7587.5	243
603	SO297	7572.5	113
604	SO298	7557.5	243
605	SO299	7542.5	113
606	SO300	7527.5	243
607	SO301	7512.5	113
608	SO302	7497.5	243
609	SO303	7482.5	113
610	SO304	7467.5	243
611	SO305	7452.5	113
612	SO306	7437.5	243
613	SO307	7422.5	113
614	SO308	7407.5	243
615	SO309	7392.5	113
616	SO310	7377.5	243
617	SO311	7362.5	113
618	SO312	7347.5	243
619	SO313	7332.5	113
620	SO314	7317.5	243
621	SO315	7302.5	113
622	SO316	7287.5	243
623	SO317	7272.5	113
624	SO318	7257.5	243
625	SO319	7242.5	113
626	SO320	7227.5	243
627	SO321	7212.5	113
628	SO322	7197.5	243
629	SO323	7182.5	113
630	SO324	7167.5	243
631	SO325	7152.5	113
632	SO326	7137.5	243
633	SO327	7122.5	113
634	SO328	7107.5	243
635	SO329	7092.5	113
636	SO330	7077.5	243
637	SO331	7062.5	113
638	SO332	7047.5	243
639	SO333	7032.5	113
640	SO334	7017.5	243
641	SO335	7002.5	113
642	SO336	6987.5	243
643	SO337	6972.5	113
644	SO338	6957.5	243
645	SO339	6942.5	113
646	SO340	6927.5	243
647	SO341	6912.5	113
648	SO342	6897.5	243
649	SO343	6882.5	113
650	SO344	6867.5	243
651	SO345	6852.5	113
652	SO346	6837.5	243
653	SO347	6822.5	113
654	SO348	6807.5	243
655	SO349	6792.5	113
656	SO350	6777.5	243
657	SO351	6762.5	113
658	SO352	6747.5	243
659	SO353	6732.5	113
660	SO354	6717.5	243
661	SO355	6702.5	113
662	SO356	6687.5	243
663	SO357	6672.5	113
664	SO358	6657.5	243
665	SO359	6642.5	113
666	SO360	6627.5	243
667	SO361	6612.5	113
668	SO362	6597.5	243
669	SO363	6582.5	113
670	SO364	6567.5	243
671	SO365	6552.5	113
672	SO366	6537.5	243
673	SO367	6522.5	113
674	SO368	6507.5	243
675	SO369	6492.5	113
676	SO370	6477.5	243
677	SO371	6462.5	113
678	SO372	6447.5	243
679	SO373	6432.5	113
680	SO374	6417.5	243
681	SO375	6402.5	113
682	SO376	6387.5	243
683	SO377	6372.5	113
684	SO378	6357.5	243
685	SO379	6342.5	113
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1732	SO1417	-10227.5	243	1787	SO1472	-11052.5	113	1842	SO1527	-11877.5	243
1733	SO1418	-10242.5	113	1788	SO1473	-11067.5	243	1843	SO1528	-11892.5	113
1734	SO1419	-10257.5	243	1789	SO1474	-11082.5	113	1844	SO1529	-11907.5	243
1735	SO1420	-10272.5	113	1790	SO1475	-11097.5	243	1845	SO1530	-11922.5	113
1736	SO1421	-10287.5	243	1791	SO1476	-11112.5	113	1846	SO1531	-11937.5	243
1737	SO1422	-10302.5	113	1792	SO1477	-11127.5	243	1847	SO1532	-11952.5	113
1738	SO1423	-10317.5	243	1793	SO1478	-11142.5	113	1848	SO1533	-11967.5	243
1739	SO1424	-10332.5	113	1794	SO1479	-11157.5	243	1849	SO1534	-11982.5	113
1740	SO1425	-10347.5	243	1795	SO1480	-11172.5	113	1850	SO1535	-11997.5	243
1741	SO1426	-10362.5	113	1796	SO1481	-11187.5	243	1851	SO1536	-12012.5	113
1742	SO1427	-10377.5	243	1797	SO1482	-11202.5	113	1852	SHIELDING	-12055.0	258
1743	SO1428	-10392.5	113	1798	SO1483	-11217.5	243	1853	COM1_OUT	-12105.0	258
1744	SO1429	-10407.5	243	1799	SO1484	-11232.5	113	1854	COM1_OUT	-12155.0	258
1745	SO1430	-10422.5	113	1800	SO1485	-11247.5	243	1855	SHIELDING	-12205.0	258
1746	SO1431	-10437.5	243	1801	SO1486	-11262.5	113	1856	F_CtrlR	-12403.0	278
1747	SO1432	-10452.5	113	1802	SO1487	-11277.5	243	1857	OEVR	-12303.0	238
1748	SO1433	-10467.5	243	1803	SO1488	-11292.5	113	1858	SYNC1R	-12403.0	198
1749	SO1434	-10482.5	113	1804	SO1489	-11307.5	243	1859	SYNC2R	-12303.0	158
1750	SO1435	-10497.5	243	1805	SO1490	-11322.5	113	1860	UDR	-12403.0	118
1751	SO1436	-10512.5	113	1806	SO1491	-11337.5	243	1861	CKVR	-12303.0	78
1752	SO1437	-10527.5	243	1807	SO1492	-11352.5	113	1862	STV2R	-12403.0	38
1753	SO1438	-10542.5	113	1808	SO1493	-11367.5	243	1863	STV1R	-12303.0	-2
1754	SO1439	-10557.5	243	1809	SO1494	-11382.5	113	1864	F_CtrlR	-12403.0	-42
1755	SO1440	-10572.5	113	1810	SO1495	-11397.5	243	1865	STBNR	-12303.0	-82
1756	SO1441	-10587.5	243	1811	SO1496	-11412.5	113		ALIGNMENT_M	-12131.5	115.5
1757	SO1442	-10602.5	113	1812	SO1497	-11427.5	243		ARK_L		
1758	SO1443	-10617.5	243	1813	SO1498	-11442.5	113		ALIGNMENT_M	12131.5	115.5
1759	SO1444	-10632.5	113	1814	SO1499	-11457.5	243		ARK_R		
1760	SO1445	-10647.5	243	1815	SO1500	-11472.5	113				
1761	SO1446	-10662.5	113	1816	SO1501	-11487.5	243				
1762	SO1447	-10677.5	243	1817	SO1502	-11502.5	113				
1763	SO1448	-10692.5	113	1818	SO1503	-11517.5	243				
1764	SO1449	-10707.5	243	1819	SO1504	-11532.5	113				

10. DEFINITIONS

10.1. Data Sheet Status

Preliminary Data Sheet	This data sheet contains preliminary data; supplementary data may be published later.
Data Sheet	This data sheet contains final product specifications.

Contents in the document are subject to change without notice.

10.2. Life Support Application

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. fitipower customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify fitipower for any damages resulting from such improper use or sale.

11. REVISION HISTORY

Reversion	Content	Date
0.1	New Issue.	2010/04/12
0.2	1.Modify SEL[0:1] pin define(p11) 2.Update Gamma table(p18,p19,p20)	2010/06/01
0.3	1.Modify application power circuit(p7) 2.Modify PINCTRL Pin Description(p12) 3.Add R2/R3 register(p16) 4.Modify gamma table(p19,20,21)	2010/08/30
0.4	Modify Dual gate diagram(p5)	2011/03/24
0.5	1.Modify TTL input timing(p23~p27) 2. Modify GRB pin definition and GRB delay time spec(p10,33)	2011/05/27
1.0	Modify external terminal resistor for LVDS IF(p9)	2012/08/23
1.1	1. Modify wiring resistance (p13) 2. Modify chip outline dimensions (p40)	2013/08/28