

BESTECH Corporation

TFT LCD MONITOR SPECIFICATION

Model : BTL-XXXXXXXXXXXX

(Option : DVI & Audio)

RoHs
Compliant



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1. REVISION HISTORY

Revision	Description of Change	Date
1.0	First Release	Feb.2005
2.0	Support 5V out-put through D-Sub connector (pin number is #9)	Mar.2006
3.0	Protection circuit add	Oct.2007
4.0	Power input connector add	Mar.2008
5.0	Main (scaler) IC Change : from TSUM56AL to TSUM5PFL (New IC can display upto 1440x1050) This board can use two main IC as below TUSUM5PFL : upto 1440x1050 TSUM58EL : upto 1920x1200	Jun.2009
6.0	3.3V output add through LVDS out connector for a special Panel	JUN.2011
7.0	Add additional circuit for a stabile panel ON/OFF control	JUL.2011

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2. GENERAL DESCRIPTION

BESTECH TFT-LCD Monitor has been designed to drive up to 1920 X 1200 @ 60Hz. (LVDS interface panel) by firmware change and main IC change.

- Available panel resolution are as below
640 X 480 (VGA) resolution @ 60Hz
800 X 600 (SVGA) resolution @ 60Hz
1024 X 768 (XGA) resolution @ 60Hz
1366 X 768 (WXGA) resolution @ 60Hz
1280 X 1024 (SXGA) resolution @ 60Hz
1440 X 900 (SXGA+) resolution @ 60Hz
1680 X 1050 (WSXGA) resolution @ 60Hz
1600 X 900 (UXGA) resolution @ 60Hz
1600 X 1200 (UXGA) resolution @ 60Hz
1920 X 1080 (WUXGA) resolution @ 60Hz
1920 X 1200 (WUXGA) resolution @ 60Hz
- Main IC information
TSUM5PFL : upto 1440 X 900 resolution display
TSUMU58EL : upto 1920 X 1200 resolution display
- DVI & Audio functions are optional on customer's requirement.

3. FEATURES

- State of the art high performance picture quality
- Analog RGB & DVI
- Multi-sync capability up to 1920 X 1200 (WUXGA) resolution @ 60Hz.
- True color (16.78M) data processing and display driving
- On-Screen-Display (OSD) user interface
- Multi language support (into OSD menu)
- VESA DDC1/2B compliant
- operating temperature: 0 to 50°C

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4. Applicable Graphic Mode

4-1 Standard (VESA) Graphic Mode

No.	Resolution	H-freq' [KHz]	Refresh rate [Hz]	Rixel Clock [MHz]	Remarks
1	640 X 350	31.5	70.0	25.1	Text
2	720 X 400	31.5	70.0	28.3	Text
3	640 X 480	35.0	66.6	30.2	MAC
4	640 X 480	31.5	59.9	25.1	VESA
5	640 X 480	37.8	72.0	31.5	VESA
6	640 X 480	37.5	75.0	31.5	VESA
7	800 X 600	37.9	60.3	40.0	VESA
8	800 X 600	48.0	72.2	50.0	VESA
9	800 X 600	46.9	75.0	49.5	VESA
10	1024 X 768	48.4	60.0	65.0	VESA
11	1024 X 768	56.4	70.0	75.0	VESA
12	1024 X 768	60.0	75.0	78.5	VESA
13	1152 X 864	67.5	75.0	108.0	VESA
14	1280 X 720	44.7	60.0	74.2	VESA
15	1280 X 800	49.7	59.8	83.5	VESA
16	1280 X 1024	64.0	60.0	108.0	VESA
17	1280 X 1024	80.0	75.0	135.0	VESA
18	1360 X 768	47.7	60.0	85.5	VESA
19	1440 X 900	55.9	60.0	106.5	VESA
20	1600 X 900	60.0	60.0	108.0	VESA
21	1680 X 1050	65.2	59.9	146.2	VESA
22	1600 X 1200	75.0	60.0	162.0	VESA
23	1920 X 1080	67.5	60.0	148.5	VESA
24	1920 X 1200	74.0	59.9	154.0	VESA

Available display resolution will be decide by each panel specification.

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4. Applicable Graphic Mode

4-2 Industrial Graphic Mode (CGA & EGA)

No.	Mode	Resolution	H-freq' [KHz]	Refresh rate [Hz]	Remarks
1	CGA	680 X 224	15.5	58.9	BTL-XXXXXXXX10/20XX
2	CGA	720 X 254	15.6	55.3	BTL-XXXXXXXX10/20XX
3	CGA	600 X 290	15.7	51.2	BTL-XXXXXXXX10/20XX
4	CGA	600 X 259	15.7	51.2	BTL-XXXXXXXX10/20XX
5	CGA	758 X 230	16.1	50.4	BTL-XXXXXXXX10/20XX
6	CGA	690 X 240	16.8	59.8	BTL-XXXXXXXX10/20XX
7	CGA	680 X 224	16.8	59.8	BTL-XXXXXXXX10/20XX
8	EGA	720 X 385	23.7	54.2	BTL-XXXXXXXX10/20XX
9	EGA	720 X 400	24.4	57.4	BTL-XXXXXXXX10/20XX
10	EGA	768 X 480	24.6	49.7	BTL-XXXXXXXX10/20XX
11	EGA	720 X 422	25.7	60.2	BTL-XXXXXXXX10/20XX
12	EGA	720 X 411	26.5	55.9	BTL-XXXXXXXX10/20XX
13	VGA	640 x 480	32.1	63.1	BTL-XXXXXXXX10/20XX
14	VGA	640 x 480	35.0	66.7	BTL-XXXXXXXX10/20XX

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5. ELECTRICAL PARAMETERS

5-1 Overall parameters

Symbol	Description	Min.	Typ.	Max.	Unit
V _{CC}	+12V DC	10.8	12.0	13.2	V
V _{i(sync)}	Analog Input level	0.5	0.7	1.0	V _{pp}
F _{HS}	H sync Frequency	15		83	KHz
F _{VS}	V sync Frequency	50	60	75	Hz
V _{IH}	Digital input high level	2.0			V
V _{IL}	Digital input Low level			0.8	V
Dclk	Dot clock	120	144	175	MHz
Pixel pitch					
Color depth	16.7M color				
Storage temperature		-20		60	°C
Operating temperature		0		50	°C

Above value are maximum value of the board.
The detail value will be decide by each panel specification.

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5-2 Power summary

Size	15"	17"	19"	20.1"
Input	AC/DC Adapter 100-240VAC 47/ 63Hz,			
	12VDC/3A	12VDC/3.75A	12VDC/3.75A	12VDC/4A
Consumption	32W max	42W max	45W max	50W max.
Size	23"	26"	32"	42"
Input	AC/DC Power Board 100-240VAC 47/63Hz			
Consumption	110W max.	130W max.	140W max.	200W max.

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5-2 Power (Adaptor : PA-1041-01)

1. Description

This product is a AC to DC power transfer device, it can provide for a **40W** single dc output with constant voltage source.

2. Electrical

2.1 Input Voltage

- a. 100 - 240Vac Nominal.
- b. 90 - 264Vac Universal.

2.2 Input Frequency

47- 63Hz.

2.3 Input Current

1.2 A max. at 90Vac input & dc output full-loading.

2.4 Inrush Current

Inrush peak current and Joule integral will be measured at different line voltage at high ambient temperture.

Peak current is within specified limit and Joule integral well below fuse and bridge spec.

2.5 Hold-Up time

10msec min. at dc output full-loading and 115Vac input.

2.6 Input wattage

Less than **0.3W** at 230Vac input & no load condition.

2.7 Efficiency

Average efficiency **85.5%** minimum min. at 25%, 50%, 75% & 100% of full-loading and 115/230Vac input (After warm up 20 minutes).

2.8 Safety Test

- a. Leakage current less than **0.25 mA** at 254Vac, 50Hz.
 - b. Hi-Pot test : **1800 Vac**, 10mA, 1 – 3 Sec. between Primary to Secondary ground.
 - c. Insulation resistance: at dc 500Vdc, 1 Sec. between Primary to Secondary circuit, IR shall $\geq 20M\Omega$.
 - d. Grounding test : AC 30A , 2 Sec. between input safety ground and SELV output GND, GR $\leq 0.1\Omega$.
-

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5-2 Power (Adaptor : PA-1041-01)

2.9 Output Voltage and Current

Vout (V)	Range (V)	Iout (min., A)	Iout (max., A)	Peak (10S, A)
12V	11.4 – 12.6	0	3.33	4.0

2.10 Ripple and Noise

Low frequency ripple (< 100KHz) $\leq 300\text{mVpp}$, and Total composite Ripple and Noise. Less than 300mVp-p , tested by dc loading side parallel with a $10\mu\text{F/EC}$. and $0.1\mu\text{F/Ceramic}$. Capacitors and Measured Band Width 20MHz.

2.11 Over-Shoot and under-shoot

Less than 10% of nominal Voltage value.

2.12 Protection

- a. SCP : Short circuit protection with auto. recovery function.
- b. OVP : Over voltage protection with shut down & latch off function.
Tripped voltage will be less than 18Vdc .
- c. OCP : Over current protection with auto. recovery function,
current limit : 6 A (max.)
- d.OTP: The adapter shall provide Over Temperature Protection and if the temperature rises to set temperature point ,the PSU shall be latch-off.

2.13 LED Indication

Green light for Nominal operation. Blank or Flash for SCP mode.

2.14 Rise time

Rise time shall be less than 50msec. , it should be measured from 10% to 90% of the output voltage.

2.15 Turn on delay time

The output voltage should turn on from AC on to settle within regulation in less than 3.0sec.

2.16 Temperature Coeffieence

Less than $0.2\%/^{\circ}\text{C}$

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5-2 Power (Adaptor : PA-1041-01)

2.17 Transient Response

Dynamic loading condition.

DC output (V)	I1 (A)	I2 (A)	dVmax.(V)	Time-max.	dI/dT
12.0	0.00	0.83	+/- 1.0	10 msec.	$\geq 50\text{mA}/\mu\text{sec.}$
12.0	0.83	1.66	+/- 1.0	10 msec.	$\geq 50\text{mA}/\mu\text{sec.}$
12.0	1.66	3.33	+/- 1.0	10 msec.	$\geq 50\text{mA}/\mu\text{sec.}$

50% of duty cycle.

3. Environment

3.1 Temperature

- a. Operation : 0 to 40 °C
- b. Storage : -40 to 70 °C

3.2 Humidity

- a. Operation : 20 to 80%
- b. Storage : 10 to 90%

3.3 Altitude

From sea level to 2000m (operation) and 2000m above (Non operation).

4. EMC

4.1 EMS

Test Item	Test Specification	IEC Standards
ESD	Contact +/- 8KV	61000-4-2
ESD	Air +/- 15KV	61000-4-2
RS	FR: 26MHz-1.0GHz, Field Strength: 3V/M	61000-4-3
EFT	+/- 1KV (DM) & +/- 2KV (CM)	61000-4-4
SURGE	+/- 6KV (DM) & +/- 6KV (CM)	61000-4-5
CS	3V/M	61000-4-6
DIPS	0% 250Cy, 40% 5 Cy, 70% 5Cy	61000-4-11

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5-2 Power (Adaptor : PA-1041-01)

4.2 EMI

Standards	Specification
FCC	Part 15,class B
VCCI	Class B
CISPR	Part 22,class B

5. Reliability

5.1 Life (E-cap.)

12,000 hours (8 hours/day x 300 days/year x 5 years)

At DC output full-loading, AC 115/230 Vac input & ambient temperature 25°C.

5.2 M.T.B.F.

50,000 Power On Hours at 25°C.

5.3 Temperature Rise.

Less than 45°C at nominal AC input / DC output full-loading and environment temperature 25+/-1°C on Top/Bottom of plastic case.

5.4 Burn-in

100% Burn-In with 80~100% full-loading & 35~45°C Environment temperature.

5.5 Vibration Test

a. Non operation vibration with shipping container shall be 2G'S peak/7-50Hz, 4G'S /50-500Hz, after test no abnormally to be found.

b. Operation vibration shall be 0.5G'S peak/10-60Hz, 3 AXES, after test no abnormally to be noted.

5.6 Drop-Test

Test height is 100cm, after drop test no function abnormally to be noted.

6. Mechanical

6.1 Plastic enclosure : PC+ABS material.

6.2 Physical Size : 115 mm(L) * 51 mm (W) * 32 mm (H).

6.3 DC cord: 1500 mm, 18 AWG wires.

6.4 Weight : 350g.

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6. TFT LCD Panel Spec

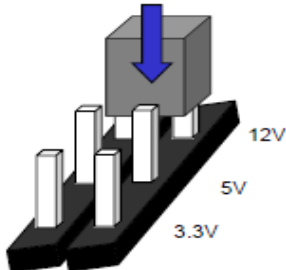
TFT LCD panel				
Screen Size	15"	17"	19"	20.1"
Aspect Ratio	4 : 3	5 : 4	5 : 4	4 : 3
Resolution	1024x768	1280x1024	1280x1024	1600x1200
Pixel Pitch (mm)	0.297	0.264	0.294	0.255
Active Area (mm)	304.1x 228.1	337.9x270.3	376.3x301.1	408.0x306.0
Number of Colors	16.2M	16.2M	16.2M	16.7M
Contrast Ratio	700:1	700:1	700:1	800:1
Brightness	250cd/m ²	300cd/m ²	300cd/m ²	300cd/m ²
Viewing Angle	150/135	150/135	150/135	160/160
Response Time	8ms	8ms	8ms	5ms
Wide Screen				
Screen Size	23"	26"	32"	42"
Aspect Ratio	16 : 9	16 : 9	16 : 9	16 : 9
Resolution	1366x768	1366x768	1366x768	1366x768
Pixel Pitch (mm)	0.372	0.421	0.511	0.681
Active Area (mm)	508.2x285.7	575.8x323.7	697.7x392.3	930.2x523.0
Number of Colors	16.7M	16.7M	16.7M	16.7M
Contrast Ratio	550:1	1200:1	1200:1	1200:1
Brightness	600cd/m ²	600cd/m ²	600cd/m ²	600cd/m ²
Viewing Angle	178/178	178/178	178/178	178/178
Response Time	8ms	8ms	8ms	8ms

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Connectors & Jumper

Ref	Item	Function	Part Number
J6	Jack	DC Input	
J4	Jack	Audio In	
J1	Connector	DVI	
J3	Connector	D-Sub 15pin (F)	
J5	Connector	Inverter	
J10	Connector	Power output	
J16	Connector	Power input	
J7	Connector	Power input	
J14	Connector	Audio Out	
J9	Connector	OSD	
J2	Connector	LVDS Output	
RP1	Jumper	Panel Vol. Adjust	

RP1 : Jumper - Panel Power adjust

Description	Jumper setting
3.3V / 5V / 12V CAUTION : Incorrect setting can damage the panel	

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J1 : DVI Input

Pin No.	Symbol	Description
1	TMDS Data 2-	TMDS Data Negative signal (R-)
2	TMDS Data 2+	TMDS Data Positive signal (R+)
6	DDC Clock	Clock for EDID
7	DDC Data	Data for EDID
9	TMDS Data 1-	TMDS Data Negative signal (G-)
10	TMDS Data 1+	TMDS Data Positive signal (G+)
14	+5V Signal	+5V for EDID
15		
16	+5V	HPD
17	TMDS Data 0-	TMDS Data Negative signal (B-)
18	TMDS Data 0+	TMDS Data Positive signal (B+)
23	TMDS Clock+	TMDS Clock+
24	TMDS Clock-	TMDS Clock-
4,5,8,12,13,20,21,25,26,27,28,8,29	NC	No-Connection
3,11,19,22,30	GND	Ground

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J3 : Analog RGB Input

Pin No.	Symbol	Description
1	R	RED Analog Input
2	G	Green Analog Input
3	B	Blue Analog Input
5	Detector	Signal Detector
12	SDA	Serial Data
13	H Sync	Horizontal Sync
14	V Sync	Vertical Sync
15	CLK	Serial Clock
9	V out	5V Output
4,6,7,8, 10,11	GND	Ground

J5 : Inverter

Pin No.	Symbol	Description
1,2	+12V	+12V
3,4	GND	Ground
5	On/Off	Backlight On/Off
6	Adjust	Backlight Adjust (Dimming)

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J10 : Power Output

Pin No.	Symbol	Description
1	12Pout	12V Power Output for a Touch board
3	5Pout	5V Power Output for a Touch board
2,4	GND	Ground

J14 : Audio Output

Pin No.	Symbol	Description
1	Audio Out	Audio out - Left
4	Audio Out	Audio out - Right
2,3	GND	Ground

J9 : OSD

Pin No.	Symbol	Description
1	LED	LED1
2	LED	LED2
3	GND	Ground
4	Key1	Menu, Select, Power
5	Key2	Down, Up

J7, J16 : Power Input

Pin No.	Symbol	Description
1	Pin	12V Power Input
2	GND	Ground

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J2 : LVDS Interface connector

Pin No.	Symbol	Description
1	Vcc	Power In
2	Vcc	Power In
3	Vcc	Power In
4	N/C	No Connection
5	N/C	No Connection
6	N/C	No Connection
7	GND	Ground
8	RxE3+	LVDS Signal of Even Channel 3(+)
9	RxE3-	LVDS Signal of Even Channel 3(-)
10	RxEC+	LVDS Signal of Even Channel Clock(+)
11	RxEC-	LVDS Signal of Even Channel Clock(-)
12	RxE2+	LVDS Signal of Even Channel 2(+)
13	RxE2-	LVDS Signal of Even Channel 2(-)
14	GND	Ground
15	RxE1+	LVDS Signal of Even Channel 1(+)
16	RxE1-	LVDS Signal of Even Channel 1(-)
17	GND	Ground
18	RxE0+	LVDS Signal of Even Channel 0(+)
19	RxE0-	LVDS Signal of Even Channel 0(-)
20	RxO3+	LVDS Signal of Odd Channel 3(+)
21	RxO3-	LVDS Signal of Odd Channel 3(-)
22	RxOC+	LVDS Signal of Odd Channel Clock(+)
23	RxOC-	LVDS Signal of Odd Channel Clock(-)
24	GND	Ground
25	RxO2+	LVDS Signal of Odd Channel 2(+)
26	RxO2-	LVDS Signal of Odd Channel 2(-)
27	RxO1+	LVDS Signal of Odd Channel 1(+)
28	RxO1-	LVDS Signal of Odd Channel 1(-)
29	RxO0+	LVDS Signal of Odd Channel 0(+)
30	RxO0-	LVDS Signal of Odd Channel 0(-)

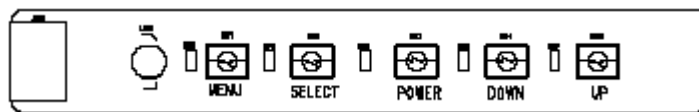
Second Pixel Data

First Pixel Data

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7-2. OSD Board

Dimension : 110mm(W) X 15mm(L) X 10mm



MENU	Activate OSD menu or save OSD setting and EXIT
SELECT	Select the menu icons
POWER	Turn on or off the main board
UP	Increase setting or right shift the menu
DOWN	Decrease setting or left shift the menu

Press the Menu button to display OSD menu.

Move to requirement OSD Menu and Press the SELECT button to enter the menu.

Move to requirement sub-menu and Press the SELECT button to adjust value

Press 'DOWN' or 'UP' button, you can adjust your image.

Press MENU button to save current setting and exit MENU.

LED : Status display

Green – Normal operation

RED - Power saving mode, Stand-by mode

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8. OSD USER Manual

SUMMARY OF OSD MAP

PICTURE	Brightness	
	Contrast	
	H Position	
	V Position	
	Phase	
	Clock	
	H Size	: Show CGA, EGA only
	V Size	: Show CGA, EGA only
COLOR	Color Temp	User
	Red	Reddish (6500)
	Green	Bluish (9300)
	Blue	
	Auto Color	
	Backlight	
OSD	OSD H Position	
	OSD V Position	
	OSD Timer	
	Transparence	
MISC	Language	English
	Recall	Korean
	Input Select	Espanol
	Audio	Francais
	Volume	Deutsch
	Auto Adjust	

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The OSD (On Screen Display) provides certain functions to have clear image and others.
This board supports 5 buttons OSD operation as a standard.
The control functions defined on OSD operation are as below

Functions on OSD Menu

Brightness	Adjust the brightness of the screen
Contrast	Adjust the contrast of the screen
H POSITION	Adjust the horizontal position of the screen's image
V POSITION	Adjust the vertical position of the screen's image
PHASE	Adjust the focus of the screen's image
CLOCK	Adjust the horizontal size of the screen's image
H Size	Adjust the horizontal size : CGA & EGA
V Size	Adjust the vertical size : CGA & EGA
Color Temp	Color Temperature change
R, G, B Gain	Adjust the Gain of RED, Green and Blue
Auto Color	Automatically adjust the R,G,B offset.
Backlight	Adjust the inverter dimming
LANGUAGE	Select one of the Five language(English, Korean, Espanol, Deutsch, Francias) Default is ENGLISH
Input select	Select the input mode between Analog RGB and Digital (DVI-D)
RECALL	Initial EEPROM
Auto Adjust	Automatically adjust the Horizontal position, Vertical position, Horizontal size, and Phase.
Miscellaneous	OSD H,V position, Time, Transparence, Audio, Volume

Hotkey Function

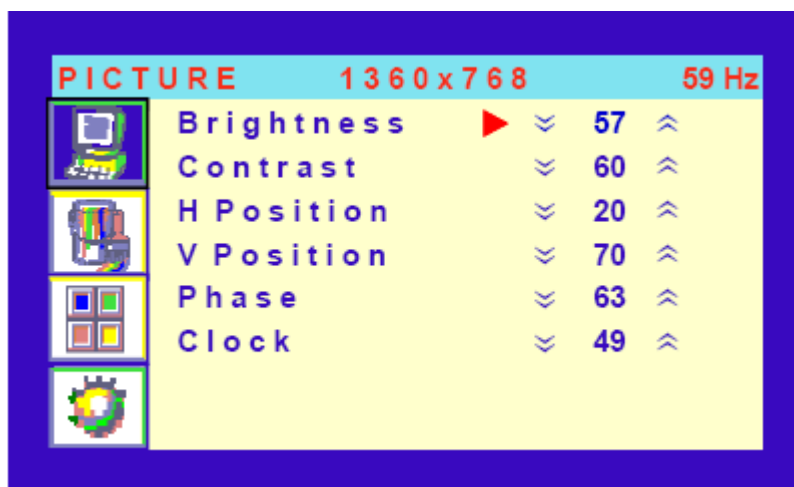
OSD Key	Function
SEL	Immediately Auto Adjustment
UP	Immediately V-Size Adjustment when CGA,EGA mode
Down	Immediately V-Size Adjustment when CGA,EGA mode

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[PICTURE]



Press the Menu button to display OSD menu and press the Select button to enter the PICTURE menu.



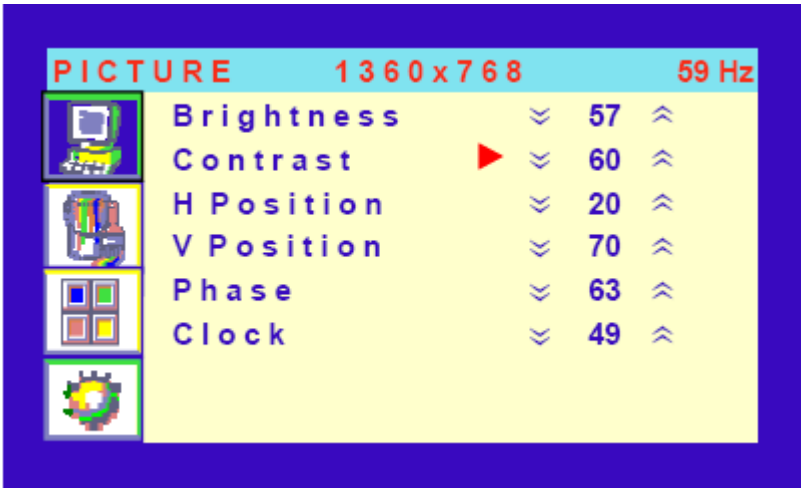
Move to your requirement sub-menu and press the Select button to adjust value.

Press down or up button, you can adjust your image.

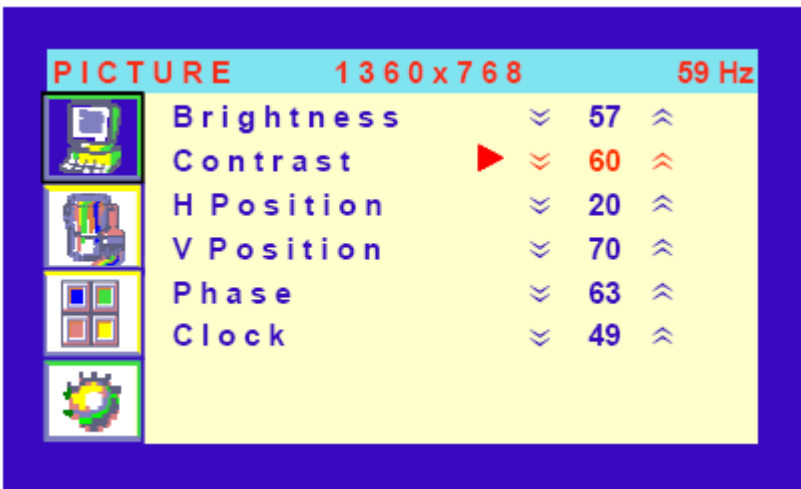
Press Menu button to save current setting and exit the OSD.

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[PICTURE] – Adjust ex: Contrast adjust from 60 to 61



Move to Contrast sub-item by Up or Down button.



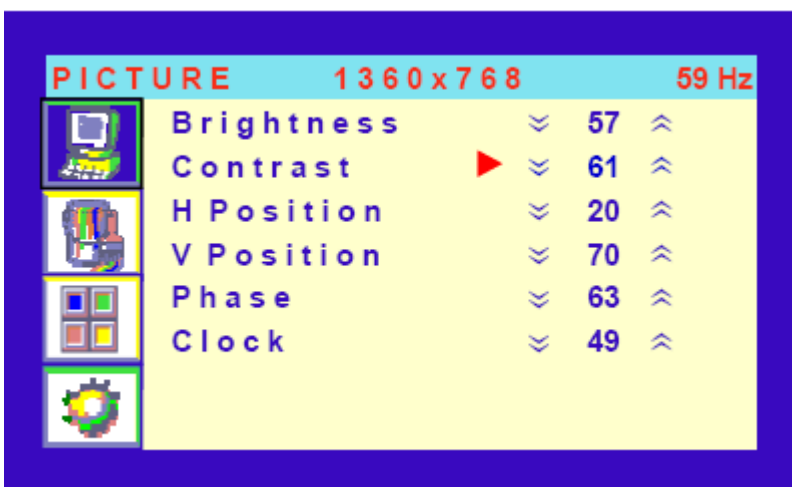
Press the select button then color will be change to RED.

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[PICTURE] – Adjust ex: Contrast adjust from 60 to 61



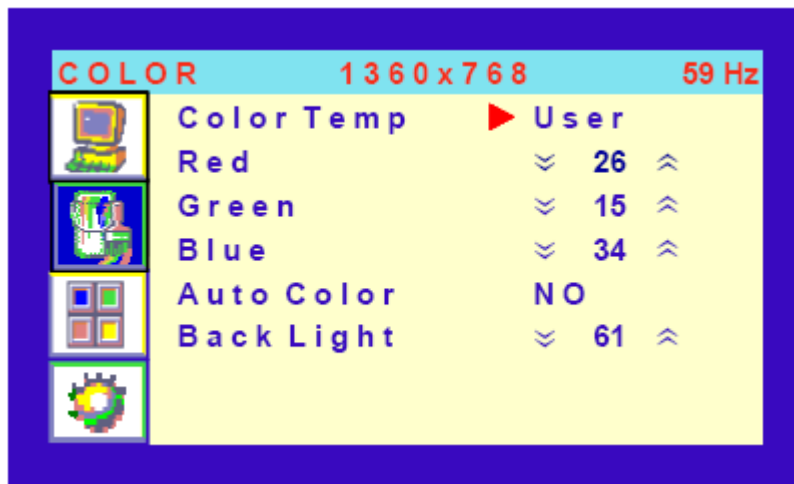
Press the Up button for value change to 61.



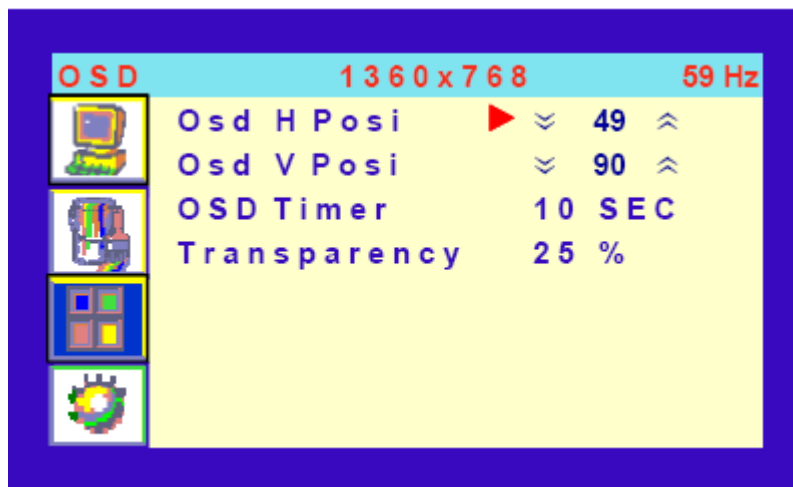
Press Menu button to save current setting and exit the Sub-item.

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[COLOR]



[OSD]



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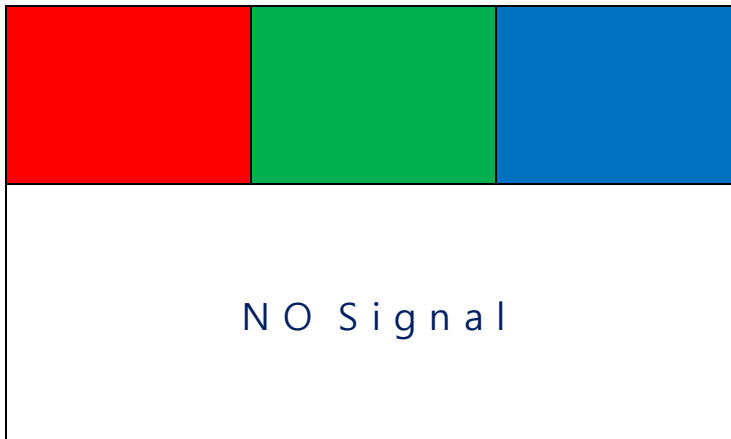
[MISCELLANEOUS]



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[Warning Message]

1. CHECK SIGNAL CABLE



2. CHECK INPUT SIGNAL Resolution



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9. Signal cable

Standard VGA cable w/15-pin D-sub, CGA/EGA optional

10. Metal Frame

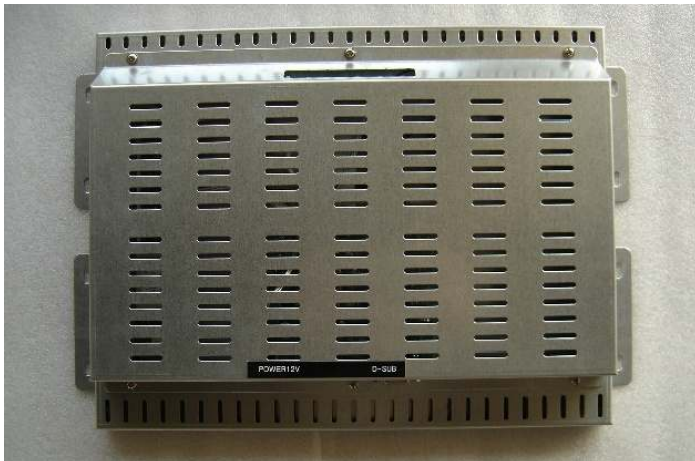
Size	15"	17"	19"	20.1"
Outline Dimension L x W x H (mm)	258 x 367 x 45	320 x 400 x 50	330 x 437 x 50	
Size	23"	26"	32"	42"
Outline Dimension L x W x H (mm)	374 x 563 x 99		490.5x764 x115	651.5x1001 x120

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11. Front View / Real View



Front View



Rear View



Side View

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