Product Specification

D- ISMART 12S02AD

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1. Revision History

Revision	ECN NO.	Description	Date	Prepared
0		Initial Release	01.01.2013	Sönke Mohr

2. General Description

2.1 Product Description

The DT-ISMART12S02 consists of a color active matrix TFT LCD module using amorphous silicon TFT's (Thin Film Transistors) as an active switching device. This module has a 30.7 cm (12.1 inch) diagonally measured active area with SVGA resolutions (800 horizontal by 600 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripes. This module can display 262k / 16.2M colors. The TFT-LCD panel used for this module is adapted for a low reflection and higher color type. The Module is no complete monitor but a component. Drive peripherals such as interface card, OSD-board, etc. are adapted to the display by a metal covering. The components are tested and tuned to work together perfectly.

2.2 Basic Components

Item	Description	Manufacturer
30.7 cm (12,1“) Active Matrix TFT LCD	**G121S1-L02**	Chi Mei
Interface-Controller	**DCMR-30S6CI108**	Uplusvision
OSD-Board	**EPAS-OSD1 SMD LED**	Uplusvision

2.3 Liability

Distronik is not responsible for changes of the components of the Module. This specification is subject to change without notification.
This specification refers to the specifications of the manufacturers of the parts.
If required, Distronik will send the full specification of the included components.

3. General Features

Item	Description	Remarks
Diagonal	30.7 (12.1“)	cm
Active area	246.00 (H) x 184.50 (V)	mm
Resolution – display	800 x 600	pixel
Resolution – controller	640 x 480 – 800 x 600	pixel
Pixel pitch	0.3075 (H) × 0.3075 (V)	mm
Pixel arrangement	RGB vertical stripe	
Display colors	262k / 16.2M	colors
Display mode	Normally black	
Brightness	600	cd/m²
Contrast ratio	1500:1	
Viewing angle	hor.: 89° / 89°, ver.: 89° / 89°	deg.
Response timec	25	msec
Interface	Analog-RGB H-Sync. / V-Sync. // DVI	
H-Sync.	31.4 – 80	KHz
V-Sync.	60 – 75	Hz
Power input voltage	12	V DC
Power consumption	15	W
Dimension	260.5 x 204.0 x 20.0	mm
Weight	832	gram
RoHS compliance	**Yes**	

4. Electrical Specification

4.1 Input Signal Characteristics

Description	Signal	Unit	Min	Typical	Max	Notes
RGB Input	Analog RGB	• Vp-p	0	-	0.7	
	Sync	• Vdc	0	-	5.5	
	Horizontal Frequency	• KHz	31.4	-	80	
	Vertical Frequency	• Hz	60	-	75	
DVI Input	Differential Output	• mVp-p	150	-	1200	
	Input clock Frequency	• MHz	25.2	-	136.8	

4.2 Power Supply and Supply Voltage Ripple

Input Signal	Description	Unit	Min	Typical	Max	Remarks
DC Input	DC Voltage	Vdc	11.4	12	12.6	
	Power Consumption	Watts	-	15	-	

- Supply ripple voltage: 100mV

4.3 Connector Pin Assignment and Description

4.3.1 Signal Input Pin Assignment

Analog-RGB Input Connector
Signal Connector: S13B-PH-SM3-TB (JST)

Group	Pin No.	Symbol	Description
Analog RGB	1	HSYNC	Horizontal Sync
	2	GND	Ground
	3	VSYNC	Vertical Sync
	4		N.C.
	5	BLUE	Blue
	6	BLUE GND	Analog Ground Blue
	7	GREEN	Green
	8	GREEN GND	Analog Ground Green
	9	RED	Red
	10	RED GND	Analog Ground Red
	11	DDC CLK	DDC Clock
	12	DDC DATA	DDC Data
	13	DET VGA	Detect VGA

DVI Input Connector
Signal Connector: S13B-PH-SM3-TB (JST)

Group	Pin No.	Symbol	Description
DVI	1	SDA	DDC Data
	2	SCL	DDC Data Clock
	3	RX2+	DVI Data 2+
	4	RX2-	DVI Data 2-
	5	GND	Ground
	6	RX1+	DVI Data 1+
	7	RX1-	DVI Data 1-
	8	GND	Ground
	9	RX0+	DVI Data 0+
	10	RX0-	DVI Data 0-
	11	GND	Ground
	12	RXC+	DVI Clock+
	13	RXC-	DVI Clock-

4.3.2 Power Supply Pin Assignment

Power Input Connector
Type: 40006WR-02 (YEONHO)

Pin No.	Symbol	Description	Note
1	GND	Ground	
2	+12 V	12V DC	

5. Optical Specifications

The test of Optical specifications shall be measured in a dark room (ambient luminance $\leq$ 1 lux and temperature = 25±2°C) with the equipment of Luminance meter system (BM-5A or CA-1000T) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0°. We refer to $\theta_{\Phi = 0}$ (=θ_3) as the 3 o'clock direction (the "right"), $\theta_{\Phi=90}$ (=θ_{12}) as the 12 o'clock direction ("upward"), $\theta_{\Phi=180}$ (=θ_9) as the 9 o'clock direction ("left") and $\theta_{\Phi=270}$ (=θ_6) as the 6 o'clock direction ("bottom"). While scanning θ and/or Φ, the center of the measuring spot on the display surface shall stay fixed. The measurement shall be executed after 30 minutes warm-up period. VDD shall be 3.3V or 5.0V +/- 10% at 25°C.

5.1 Optical Characteristics

[VDD=3.3V or 5.0V, Frame rate=60Hz, Clock=54MHz, I_{BL}= 1 A, Ta = 25±2°C]

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Remarks
Viewing Angle	Horizontal	Θ_3	CR > 10	80	89	-	Deg	Note 1
		Θ_9		80	89	-	Deg	
	Vertical	Θ_{12}		80	89	-	Deg	
		Θ_6		80	89	-	Deg	
	Horizontal	Θ_3	CR > 5	-	-	-	Deg	
		Θ_9		-	-	-	Deg	
	Vertical	Θ_{12}		-	-	-	Deg	
		Θ_6		-	-	-	Deg	
Luminance contrast ratio		CR	Θ = 0° (Center) Normal Viewing Angle	1200	1500	-		Note 2
Luminance of white		Y_W		500	600	-	cd/m²	Note 3
White luminance uniformity		ΔW		-	1.25	1.4	-	Note 4
Reproduction of color	White	Wx		0.263	0.313	0.363	-	Note 5
		Wy		0.279	0.329	0.379	-	
	Red	Rx		0.550	0.600	0.650	-	
		Ry		0.303	0.353	0.403	-	
	Green	Gx		0.298	0.348	0.398	-	
		Gy		0.518	0.568	0.618	-	
	Blue	Bx		0.100	0.150	0.200	-	
		By		0.047	0.097	0.147	-	
Response time		Tr		-	25	35	-	Note 6
		Td						

Notes:

1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing is determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface.

2. Definition of Contrast ratio (CR):
   The contrast ration can be calculated by the following expression.
   Contrast ratio (CR) = L63 (255)/L0
   L63: Luminance of gray level 63 (255)
   L0: Luminance of gray level 0
   CR = CR (5)
   CR (X) is corresponding to the contrast ratio of the point X at Figure 2

Figure 1: Measurement Set Up

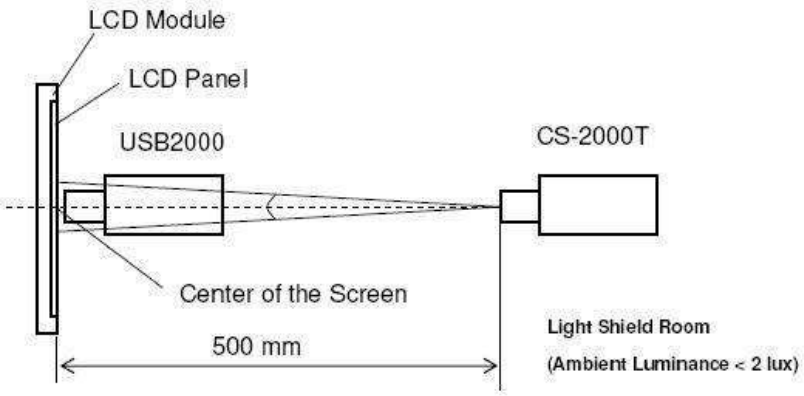
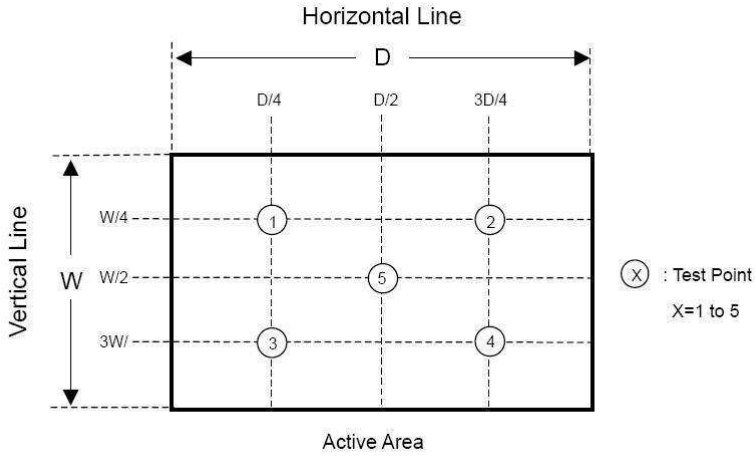


Figure 2: Average Luminance Measurement Locations & Uniformity Measurement Locations



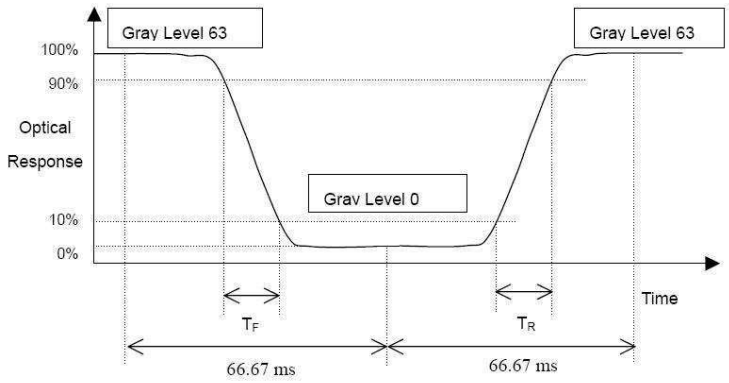
3. Definition of Luminance of White:
   Measure the luminance of gray level 63 at center point.
   (See FIGURE 2).

4. The White luminance uniformity on LCD surface is then expressed as:
   Δ white = (Maximum Luminance of 5 points / Minimum Luminance of 5 points).
   Measure the luminance of gray level 63 at 5 points.
   (See FIGURE 2).

5. The color chromaticity coordinates shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.

6. See FIGURE 3:

Figure 3: Response Time Testing



5.2 Lamp Life

Parameter	Min	Typ	Max	Unit	Remarks
Lamp Life	50.000			hrs	I_{BL} = 1 A

6. OSD Adjustment

The open frame DT-ISMART12S02AD gives a various and very easy graphics interface to its users. Users have easy access to the functions that they want to adjust. Be sure that your system's power and LED are turned on before the OSD controls are being used.

6.1 OSD LED Operating Mode

Power	Signal Input	LED (Red)	LED (Green)
On	Plugged	Off	On
Off	Plugged	Off	Off
On	Unplugged	On	On
Off	Unplugged	Off	Off

6.2 Key Name and Function

No.	Button name	Switch Function
1	Menu	1. First click : Appears the OSD main menu 2. Second click : Exit sub & main menu
2	Select	**HOT KEY FOR INPUT SIGNAL SELECTION** 1. Select main & sub menu function 2. Confirmation button for selected menu points 3. Back to the sub menu
3	Up(Right)	1. Move up/right main & sub menu 2. Increase selected value
4	Down(Left)	**HOT KEY FOR AUTO ADJUSTMENT** 1. Move down/left main & sub menu 2. Decrease selected value
SMD-LED	Status	look at 6.1 OSD LED Operating Mode
5	Power	1. Turns ON/OFF the system

Accessing the menu system:

1. With the OSD off, push the **Menu** button to activate the main OSD menu.

2. Use the **Up** and **Down** buttons to move through the main menu. To select a desired sub menu, press the **Select** button after your selection. The selection tabs are highlighted.

3. After selecting sub menu use the **Up** and **Down** buttons to move through the sub menu. To select a setting icon, press the **Select** button after your selection. The selected icons are highlighted.

4. There are two types of icons: some have a single function and must be confirmed with the **Select** button, the other options are setting bars. Once a setting bar appears, it can be increased or decreased via the **Up** and **Down** buttons. The setting bar moves and the numeric value indicator changes to reflect your adjustments.

Note: The numeric value indicator is provided as a point of reference only and has nothing to do with a real measurement.

5. There are different ways to close the OSD menu:
(a) Waiting some seconds **(timeout)**. This time can be adjusted as needed in the sub menu OSD-Menu → OSD-Timer.
(b) After an auto adjustment and confirmation the OSD menu closes automatically.
(c) After a factory reset and confirmation the OSD menu closes automatically.
(d) In the sub menu: Press the **Menu** button two times to leave the sub menu.
(e) In the main menu: Press the **Menu** button to leave the OSD menu.
(f) After adjusting a setting, press the **Select** or **Menu** button. Now your selected sub menu is highlighted. Confirm your selection with the **Menu** button to leave the sub menu. This highlights your menu selection in the main menu. Confirm again with the **Menu** button to leave the OSD menu.

6. Auto Adjustment without opening OSD menu:
- Press the **Down** button and an auto adjustment will be done automatically.

7. Input signal selection without opening OSD menu:
- Press the **Select** button and a signal selection will be done automatically.

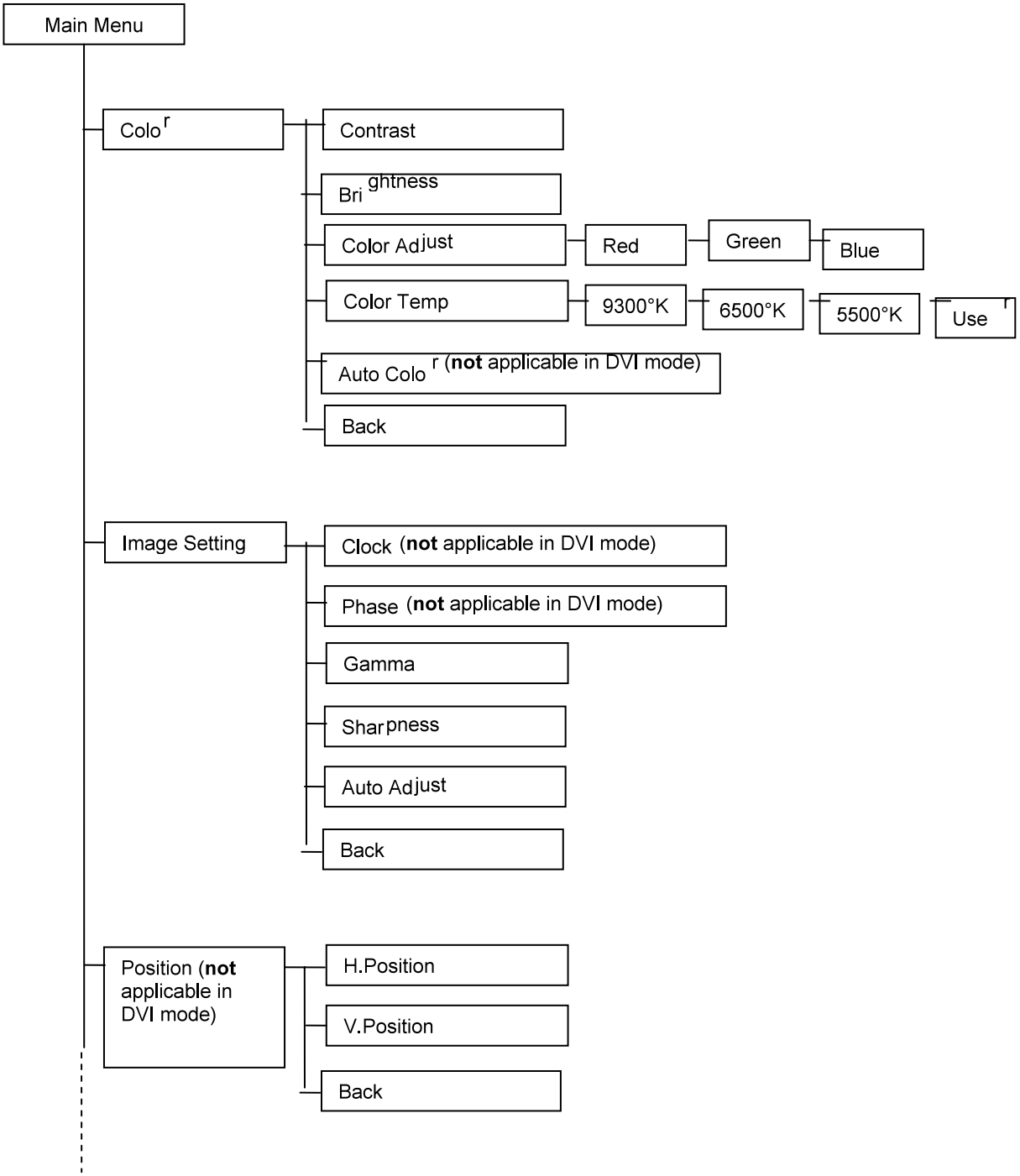
8. Booting with different input signals
If you boot the device with RGB and DVI parallel, it is possible to change between both input signals. If you boot the BCM device either with RGB or DVI, there will be an automatically signal input detection. Not connected signal inputs will not be recognized. The device identify the connected signal input, otherwise it will go into a sleeping mode. Furthermore, the device search the last input signal, this is recognized as the prior input.

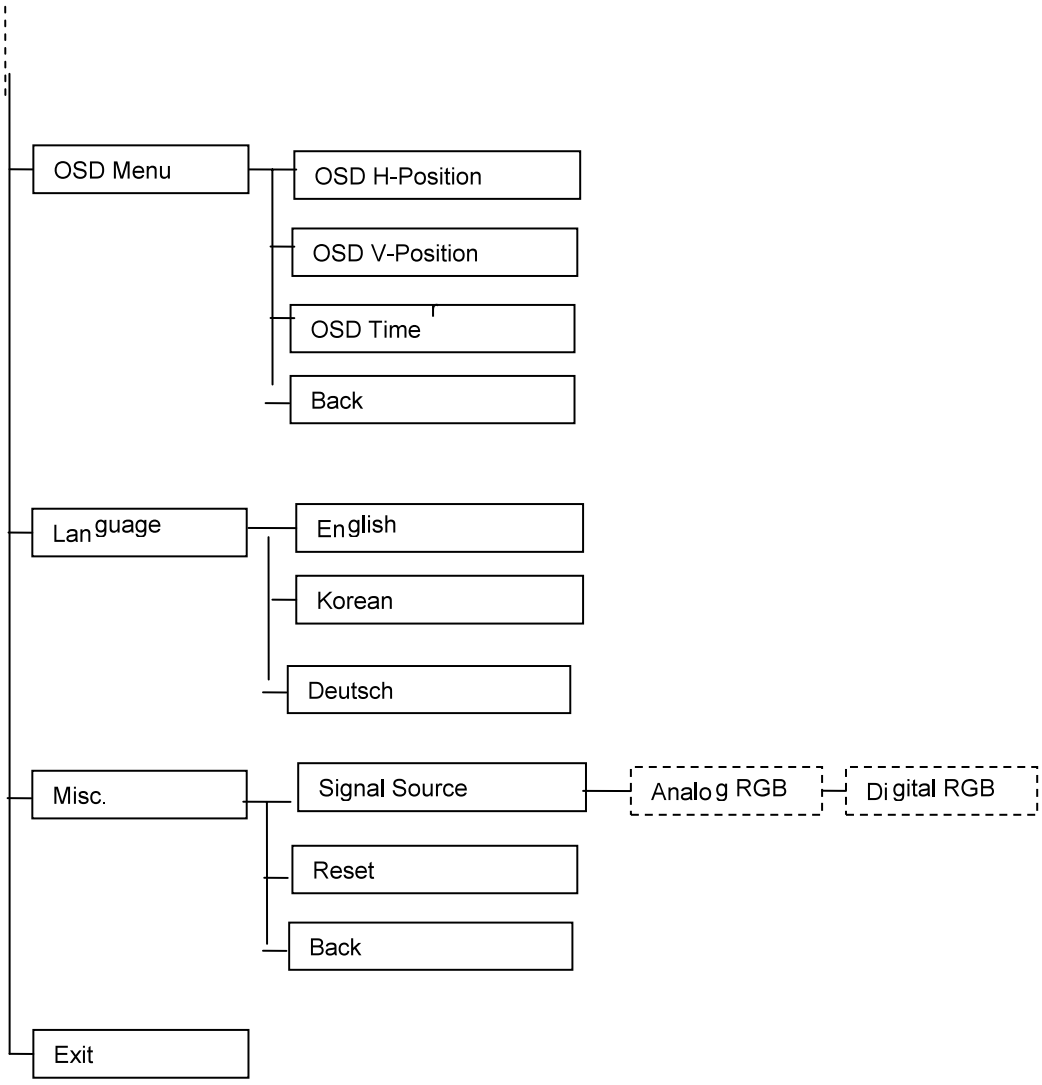
9. Storing of Display settings
If you disconnect the power supply or signal cable, all your previous display settings e.g. brightness, contrast, clock, phase etc. will be stored.

REMARK:
If you use the device with different resolutions, it is necessary to do an auto adjustment in all your operating modes. The different resolution will be stored as well. If you change your operating mode between the different resolutions, the image will be automatically 100% central adjusted.

10. Reset procedure
If you want to have a factory reset, so you have to precede a reset in your entire operating mode. Please do at first a reset on DVI-Side and after that a reset on RGB side. Right after doing it, there should be a message on the screen: “INITIALIZE”/”Auto Adjust..”.

6.3 Menu Structure




OSD Menu
OSD H-Position
OSD V-Position
OSD Time
Back
Language
English
Korean
Deutsch
Misc.
Signal Source
Analog RGB
Digital RGB
Reset
Back
Exit

6.4 Window Structure

6.4.1 Color

Main Menu

Sub Menu “Color”

- **Contrast:** Adjusts image contrast.
- **Brightness:** Adjusts displays brightness. Brightness will be regulated using the connected inverter.
- **Color Adjust:** Adjusts image color.
    - **USER:**
        - **RED:** Adjusts red color.
        - **GREEN:** Adjusts green color.
        - **BLUE:** Adjusts blue color.
- **Color Temp.:** Selects different color temperatures (9300°K / 6500°K / 5800°K / USER)
- **Auto color** (**not** applicable in DVI mode)**:** Adjusts image color automatically.
- **Back:** You will leave the sub menu back to main menu **OR** press menu button and you will leave the sub menu back to main menu.

6.4.2 Image Setting

Main Menu

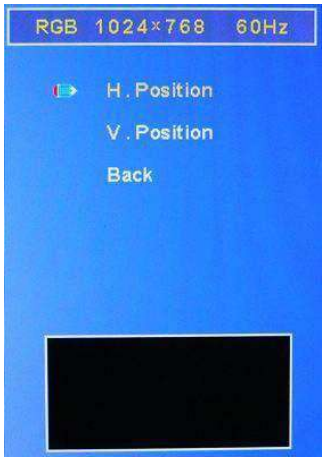
Sub Menu “Image Setting”

- **Clock** (**not** applicable in DVI mode)**:** Adjusts clocks per line (maximum length of line).
- **Phase** (**not** applicable in DVI mode)**:** Adjusts image phase.
- **Gamma:** Adjusts image gamma level.
- **Sharpness:** Adjusts image sharpness.
- **Auto Adjust:** Optimizes the displayed image. Adjusts phase and image position automatically (Message on the screen: “Auto Adjust..”).
- **Back:** You will leave the sub menu back to main menu **OR** press menu button and you will leave the sub menu back to main menu.

6.4.3 Position

Main Menu

Sub Menu “Position”

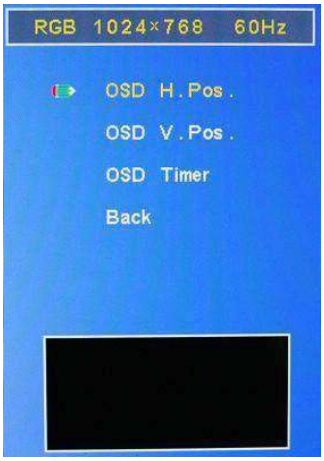


- **H.Position:** Adjusts horizontal image position.
- **V.Position:** Adjusts vertical image position.
- **Back:** You will leave the sub menu back to main menu **OR** press menu button and you will leave the sub menu back to main menu.

6.4.4 OSD Menu

Main Menu

Sub Menu “OSD Menu”



- **OSD Horizontal Position:** Adjusts OSD position horizontally.
- **OSD Vertical Position:** Adjusts OSD position vertically.
- **OSD Timer:** The OSD vanishes after a certain time of inactivity. Values of 5-20s are possible.
- **Back:** You will leave the sub menu back to main menu **OR** press menu button and you will leave the sub menu back to main menu.

6.4.5. Language

Main Menu

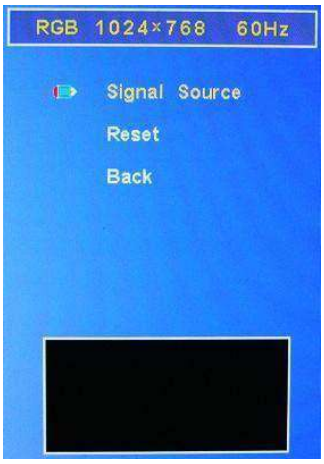
Sub Menu “Language”

- **Language:** Selects your adequate language (English, Korean, Deutsch).

6.4.6 Misc.

Main Menu

Sub Menu “Misc.”



- **Signal Source:** Selects different input signals (either Analog RGB or Digital RGB)
- **Reset:** Restores factory settings (Message on the screen: “INITIALIZE”) – **PLEASE FOLLOW THE ADVICE ON PAGE 13 Point 10 “Reset procedure”.**
- **Back:** You will leave the sub menu back to main menu **OR** press menu button and you will leave the sub menu back to main menu.

6.4.7 Exit

Main Menu

- **Exit:** Leaves the OSD-Menu

7. Environmental and Reliability Specification

The Reliability items and its conditions are shown in below.

No.	Items	Conditions	Note
1	Temperature (operating)	0 °C – 50 °C	1
2	Temperature (non-operating)	-30 °C – 85 °C	
3	Humidity (operating)	60 °C, 90% RH, 240 hours	
4	Vibration test (non operating)	Frequency: 10 ~ 300 Hz, 10 min/cycle Gravity/AMP: 1.5G Period: 3 cycles each ±X, ±Y, ±Z	
5	Shock test (non operating)	Gravity: 200G Pulse width: 2ms, half sine wave 1 time for ±X, ±Y, ±Z	

Note:

1. It is the user responsibility to keep this temperature within the above specification.

- The DT-ISMART12S02AD is not an independent final product. Therefore Distronik is not obliged to fulfil directives of EC Declaration of Conformity.
- The customer is responsible for certification of the end device.

8. Mechanical Specifications

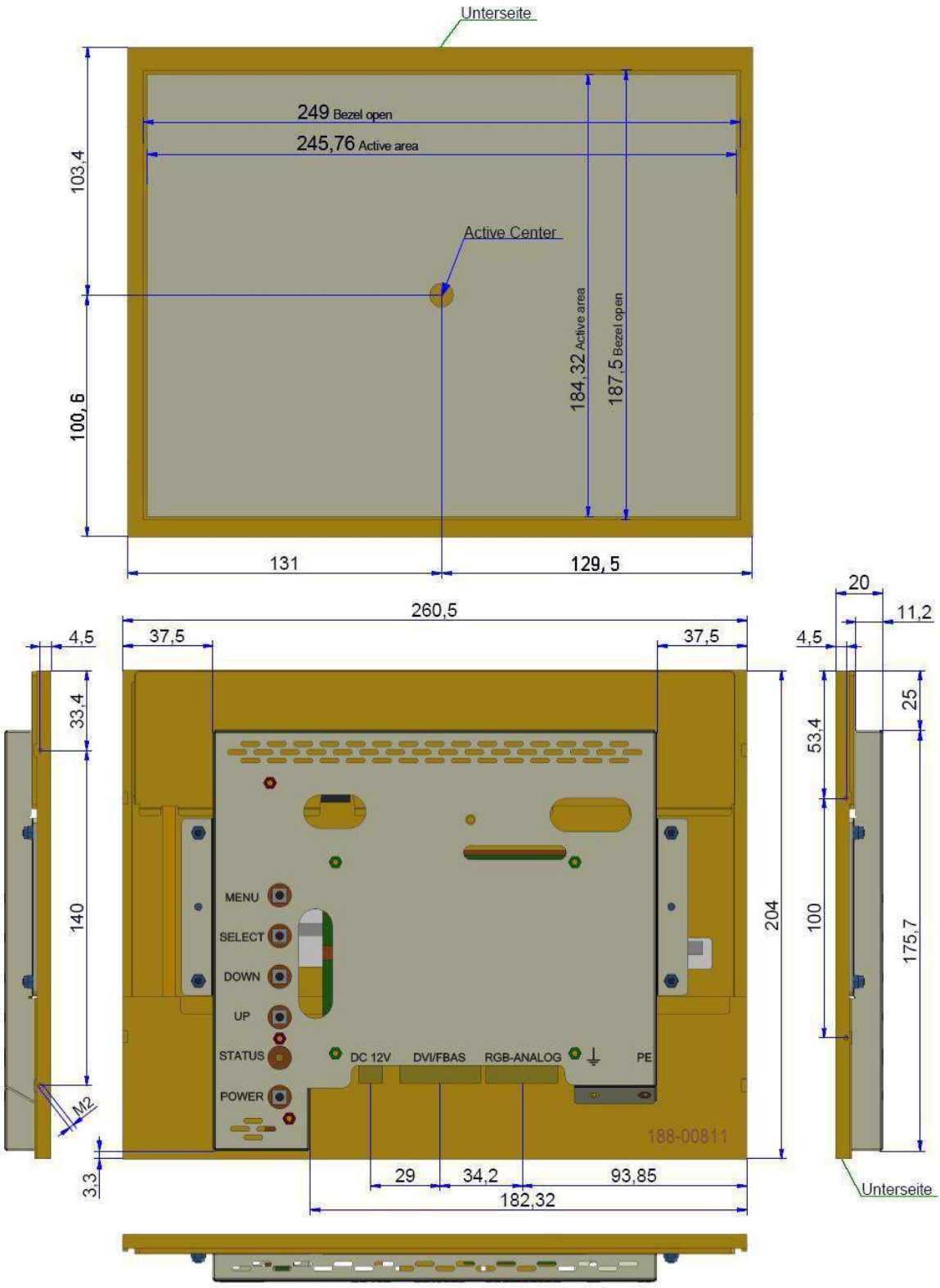
8.1 Dimensional Requirements

Figure 1 shows mechanical outlines for the model. Other parameters are shown in the below-mentioned table.

Dimensional Parameters

Parameter		Specification	Unit
Dimensional outline	Horizontal Vertical Thickness	260.5 +/- 0.5 204.0 +/- 0.5 20.0 +/- 0.5	mm
Weight		832	gram
Active Area		246.0 (H) x 184.5 (V)	mm
Pixel pitch		0.3075 (H) x 0.3075 (V)	mm
Number of pixels		800 (H) x 600 (V) (1 pixel = R+G+B dot)	pixel
Back light		LED backlight unit	

Figure 1: Mechanical Outlines



8.2 Anti-Glare and Polarizer Hardness

The surface of the LCD has an anti-glare coating to minimize reflection and a coating to reduce scratching.

9. Handling & Cautions

Cautions when taking out the module

- Pick the pouch only, when taking out module from a shipping package.

Cautions for handling the module

- As the electrostatic discharges may break the LCD module, handle the LCD module with care. Peel a protection sheet off from the LCD panel surface as slowly as possible.
- As the LCD panel and backlight element are made from fragile glass material, impulse and pressure to the LCD module should be avoided.
- As the surface of the polarizer is very soft and easily scratched, use a soft dry-cloth without chemicals for cleaning.
- Put the module display side down on a flat horizontal plane.
- Handle connectors and cables with care.

Cautions for the atmosphere

- Dewdrop atmosphere should be avoided.
- Do not store and/or operate the LCD module in a high temperature and/or humidity atmosphere. Storage in an electro-conductive polymer-packing pouch and under relatively low temperature atmosphere is recommended.

Cautions for the module characteristics

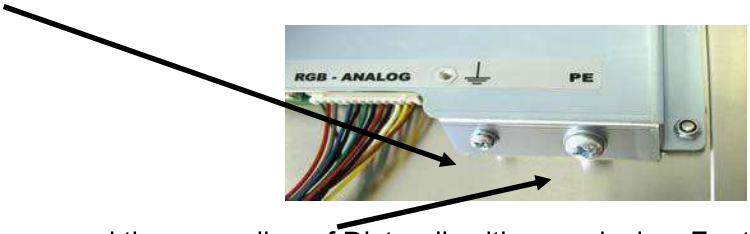
- Do not apply fixed pattern data signal to the LCD module at aging time.
- Applying fixed pattern for a long time may cause image sticking.

Other cautions

- Do not disassemble and/or re-assemble LCD module.
- Do not re-adjust variable resistor or switch etc.
- When returning the module for repair or etc, please pack the module not to be broken. We recommend on using the original shipping packages.

REMARK:

We recommend the using of shielding possibility of VGA cable to avoid any interference. Please mount the VGA cable shield on the showing position on the backside of BCM to serve this particular purpose.



We recommend the grounding of Distronik with your device. For this purpose, there is a PE connection point placed on the back side of the module.

10. Packing Information

Each of the 10 DT-ISMART12S02AD is packed into an anti-static foil.
These ten units are packed into a carton filled and cushioned with shock absorbing styrofoam and therefore very good protected for shipping.

11. Appendix

11.1 Signal Timing Chart Analog RGB / DVI

Standard	**Resolution**	**Refresh** **Rate (Hz)**	**f_{HSYNC}** **(KHz)**	**Pixel Rate** **(MHz)**
	640 x 350	70	31.4	25.2
	720 x 400	70	31.4	28.3
VGA	640 x 480	60 70 72 75	31.5 35.0 37.8 37.5	25.2 28.6 31.5 31.5
SVGA	800 x 600	60 70 72 75	37.9 43.8 48.1 46.9	40.0 45.5 50.0 49.5