

Product Service Manual – Level 2

**Service Manual for BenQ:
E900WA
P/N: 9J.0BG72.A4x/A8x**

Applicable for All Regions



**Version: 001
Date:07/06/11**

Notice:

- For RO to input specific “Legal Requirement” in specific NS regarding to responsibility and liability statements.

- Please check BenQ’s eSupport web site, <http://esupport.benq.com>, to ensure that you have the most recent version of this manual.

First Edition (June, 2006)

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Abbreviations & Acronyms

1. About This Manual

This manual contains information about maintenance and service of BenQ products. Use this manual to perform diagnostics tests, troubleshoot problems, and align the BenQ product.

1.1. Trademark

**The following terms are trademarks of BenQ Corporation:
BenQ**

Importance

Only trained service personnel who are familiar with this BenQ Product shall perform service or maintenance to it. Before performing any maintenance or service, the engineer MUST read the “Safety Note”.

2. Introduction

This section contains general service information, please read through carefully. It should be stored for easy access place for quick reference.

2.1. RoHS (2002/95/EC) Requirements – Applied to all countries require RoHS.

The RoHS (Restriction of Hazardous Substance in Electrical and Electronic Equipment Directive) is a legal requirement by EU (European Union) for the global electronics industry which sold in EU and some countries also require this requirement. Any electrical and electronics products launched in the market after June 2006 should meet this RoHS requirements. Products launched in the market before June 2006 are not required to compliant with RoHS parts. If the original parts are not RoHS complaints, the replacement parts can be non ROHS complaints, but if the original parts are RoHS compliant, the replacement parts MUST be RoHS complaints. If the product service or maintenance require replacing any parts, please confirming the RoHS requirement before replace them.

2.2. Safety Notice

1. Make sure your working environment is dry and clean, and meets all government safety requirements.
2. Ensure that other persons are safe while you are servicing the product.
DO NOT perform any action that may cause a hazard to the customer or make the product unsafe.
3. Use proper safety devices to ensure your personal safety.
4. Always use approved tools and test equipment for servicing.
5. Never assume the product's power is disconnected from the mains power supply. Check that it is disconnected before opening the product's cabinet.
6. Modules containing electrical components are sensitive to electrostatic discharge (ESD). Follow ESD safety procedures while handling these parts.
7. Some products contain more than one battery. Do not disassemble any battery, or expose it to high temperatures such as throwing into fire, or it may explode.
8. Refer to government requirements for battery recycling or disposal.

2.3 .Compliance Statement

Caution: This Optical Storage Product contains a Laser device. Refer to the product specifications and your local Laser Safety Compliance Requirements.

2.4. General Descriptions

This Service Manual contains general information. There are 3 levels of service:

- Level 1: Cosmetic / Appearance / Alignment Service
- Level 2: Circuit Board or Standard Parts Replacement
- Level 3: Component Repair to Circuit Boards

2.5. Related Service Information

BenQ Global Service Website: <http://www.benq.com/support/>
eSupport Website: <http://bqpgsr.benq.corp.com/customize/asplogin.asp>

3. Product Overview

3.1 Specification

This specification describes BenQ Sensation 19" Wide LCD monitors, which is a 19" wide Green-Product with analog interface color TFT LCD monitor.

The monitor supports maximum resolution up to 1440x900(75hz) with analog inputs.

Summary of Sensation 19" wide monitor function and feature.

1. Support VISTA Premium logo
2. Support Senseye mode : Movie 、Dynamics 、Photo 、Standard 、sRGB
3. Support DDC-CI

The features summary is shown below,

***All panel spec. in C201 definition depends on the variance of panel source.**

***All spec. of monitor need to warm up at least 1hr.**

***All spec. of monitor need to set "Color" on "User preset" mode.**

***All spec. of monitor mentioned "Contrast Ratio" the test condition: Set "brightness" at 100, and "contrast" at 50.**

***All spec. of monitor mentioned "Luminance" the test condition: Set "brightness" at 100, and "contrast" at 100.**

Feature items	Specifications	Remark
Panel supplier & module name	AUO M190PW01 V0	TN
Screen diagonal	19" wide (481.42mm)	408.24(H) x255.15(V)
Display Format	1440 (H) x 900 (V)	Panel Display information
Pixel Pitch	0.2835 mm x 0.2835 mm	per one triad
Viewing Angle (@ Contrast Ratio >= 10)	R/L:80/80 degrees (typ) U/D: 80/80 degrees (typ) R/L:70/70 degrees (min) U/D: 70/70 degrees (min)	
Analog interface with Scaling supported	Yes	With 15-pin D-sub connector
DVI interface with Scaling supported	No	With 24-pin DVI-D connector
HDMI interface with Scaling support	No	With 19-pin HDMI connector
Video interface with Scaling supported	N/A	Component, Composite, S-Video
Max resolution mode supported	1440x900@75Hz	136.48MHZ
Number of Display Colors supported	16.7 M colors	RGB 6-bits+HiFRC
Contrast Ratio	800(Typ), 600(Min)	Test Condition: Set Contrast at 50, Brightness at 100, Color at User preset
Max luminance	300 cd/m ² (typ.), 250 cd/m ² (min)	Test Condition : Set contrast at 100 , brightness at 100 , color at User preset.
AC power input	Yes	90-264 Volts, 47-63 Hz.
DC power input (with AC power adapter)	No	
DPMS supported	Yes	DPMS mode <2W, Power off-mode <1W
LED indicator for power status showed	Yes	Green/Amber/Non
OSD for control & information supported	Yes	
Multi-language supported for OSD	Yes	8 languages(Asia) 14 language(Europe)

Buttons control supported	Yes	6 buttons including 1 monitor power on/off control button.
Flywheel control supported	No	
Scaling function supported	Yes	
Auto adjustment function supported	Yes	“I-Key” function
DDC function supported (EDID ver. 1.3)	Yes	DDC2B
DDC-CI support version 1.1 or later	Yes	DDC-CI
HDMI support version 1.2	No	HDMI
Audio speakers supported	Yes	
Audio Jack (input connector) supported	Yes	
Earphone Jack (input connector) supported	No	
Microphone function supported	No	
Mechanical Tilt base design	Yes	From -5 to +20 degree
VESA wall mounting design	Yes	
Mechanical Rotate design	No	
Mechanical Lift base design	Yes	
Kensington compatible lock design	Yes	

Operational Specification

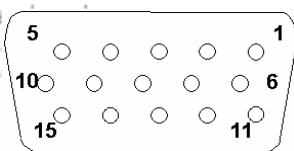
Power supply

Item	Condition	Spec	OK	N.A	Remark
Input Voltage range	Universal input full range	90~264VAC /47~63Hz	√		
Input Current range	90 ~ 264VAC	≤ 2 Arms	√		
Power Consumption	Normal “On” operation	≤ 47 W	√		LED: Green
DPMS	DPMS “Off” state	≤ 1 W	√		LED: Off DPMS mode <2W, Power off-mode <1W
Inrush Current	110 VAC 220 VAC	< 40 A (peak) < 80 A (peak)	√		Cold-start
Earth Leakage Current	264 VAC/50Hz	< 3.5 mA	√		
Hi-Pot	1. 1500VAC, 1 sec 2. Ground test: 30A, 1sec	Without damage< 0.1 ohm	√		(on-line test) (in-lab test)
Power Line Transient	IEC1000-4-4 IEC1000-4-5 (Surge)	1KV Common: 2KV, Differential: 1KV	√ √		
CCFL operation range	90 ~ 264VAC		√		Depends on panel source
CCFL Frequency	90 ~ 264VAC	40KHz ~ 60KHz	√		Depends on panel source
Power cord		Color: Black Length: 1500 +/- 50 mm	√		

Signal interface

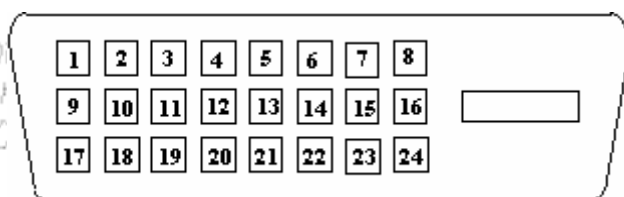
Item	Condition	Spec	OK	N.A	Remark
Signal Cable	15-pin D-Sub	Color: Black Length: 1800 +/- 30 mm	√		
	24-pin DVI-D			√	
	S and Composite video			√	
	HDMI			√	
Pin assignment	USB 2.0 cable	Color: Black Length: 1800 +/- 30 mm	√		
	15-pin D-sub connector	See Note-1	√		For 15-pin D-sub
	24-pin DVI-D connector	See Note-2		√	For 24-pin DVI-D
	19-pin HDMI connector	See Note 3		√	For 19-pin HDMI
Analog input	Signal type	Separate analog R/G/B	√		For 15 pin D-Sub
	Level	700 mV (peak to peak) +/- 5%	√		
	Impedance	75 Ohms +/- 1.5 Ohms	√		
Sync	Signal type	Separate H/V-sync Composite H/V-sync (Positive/Negative)	√		For 15-pin D-sub
	Level	Logic High: 2.4V ~ 5.5V Logic Low: 0V ~ 0.5V (TTL level)	√		Refer to VESA VSIS Standard V1R1
	Impedance	Minimum 2.2KΩ(pull down)	√		10KΩ for application
	Sync Pulse Width (SPW)	0.7μs < H-SPW 1H < V-SPW	√		
Digital input	Level	600mV for each differential line		√	
	Impedance	100 Ohm TDR Scan needed for DVI cable and interface board	√		
HDMI input		See Note-3		√	
Video pin assignment	S and RCA connector	See Note-4		√	
Video input	Level	(S-VIDEO) Y : 1 Vpp (S-VIDEO) C : 0.286 Vpp (COMPOSITE) 1 volt (p-p)		√	
	Impedance	(S-VIDEO) Y : 75 ohm (S-VIDEO) C : 75 ohm (COMPOSITE) 75 ohm		√	

Note-1: The pin assignment of 15-pin D-sub connector is as below,



Pin	Signal Assignment	Pin	Signal Assignment
1	Red video	9	PC5V (+5 volt power)
2	Green video	10	Sync Ground
3	Blue video	11	Ground
4	Ground	12	SDA
5	Cable Detected	13	H-Sync (or H+V)
6	Red Ground	14	V-sync
7	Green Ground	15	SCL
8	Blue Ground		

Note-2: The pin assignment of 24-pin DVI-D connector is as below,



Pin	Signal Assignment	Pin	Signal Assignment
1	TMDS RX2-	13	Floating
2	TMDS RX2+	14	+5V Power
3	TMDS Ground	15	Ground
4	Floating	16	Hot Plug Detect
5	Floating	17	TMDS RX0-
6	DDC Clock	18	TMDS RX0+
7	DDC Data	19	TMDS Ground
8	Floating	20	Floating
9	TMDS RX1-	21	Floating
10	TMDS RX1+	22	TMDS Ground
11	TMDS Ground	23	TMDS Clock+
12	Floating	24	TMDS Clock-



Table 4-8 Type A-to-Type A Cable Wire Assignment

Type A pin	Signal Name	Wire	Type A pin
1	TMDS Data2+	A	1
2	TMDS Data2 Shield	B	2
3	TMDS Data2-	A	3
4	TMDS Data1+	A	4
5	TMDS Data1 Shield	B	5
6	TMDS Data1-	A	6
7	TMDS Data0+	A	7
8	TMDS Data0 Shield	B	8
9	TMDS Data0-	A	9
10	TMDS Clock+	A	10
11	TMDS Clock Shield	B	11
12	TMDS Clock-	A	12
13	CEC	C	13
14	Reserved (in cable but N.C. on device)	C	14
15	SCL	C	15
16	SDA	C	16
17	DDC/CEC Ground	D	17
18	+5V Power	5V	18
19	Hot Plug Detect	C	19

Video input II: COMPOSITE video connector



CVBS

Composite jack

Video input II: COMPONENT video connector



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Component jack

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Video performance

Item	Condition	Spec	OK	N.A	Remark
Max. support Pixel rate		136.48MHz	√		Both for analog and digital inputs
Max. Resolution		1440 x 900	√		Both for analog and digital inputs
Rise time + Fall time		< 6.25 ns (50% of minimum pixel clock period)	√		1440 x 900 @ 60Hz (max. support timing)
Settling Time after overshoot /undershoot		< 5% final full-scale value	√		Refer to VESA VSIS Standard V1R1
Overshoot/Undershoot		< 12% of step function voltage level over the full voltage range	√		Refer to VESA VSIS Standard V1R1

Scan range

Item	Condition	Spec	OK	N.A	Remark
Horizontal		31~ 83 KHz	√		
Vertical		55 ~76 Hz	√		

Plug & Play DDC2B DDC-CISupport

Item	Condition	Spec	OK	N.A	Remark
DDC channel type		DDC2B	√		
EDID		Version 1.3	√		Refer to FP94VW S/W spec. document to see the detailed EDID data definition.

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DDC-CI		Version 1.1 or Later	Y	Refer to G900W S/W spec

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Support Timings

Preset	Pixel Format	HorzFreq (kHz)	Horz Polarity	Vert Freq (Hz)	Vert Polarity	Pixel Clk (MHz)	Source	19W
1	640 x 480	31.47	-	59.94	-	25.175	VGA	•
2	640 x 480	37.50	-	75.00	-	31.500	VGA	•
3	720 x 400	31.47	-	70.08	+	28.321	VGA	•
4	800 x 600	37.88	+	60.32	+	40.000	VESA	•
5	800 x 600	46.88	+	75.00	+	49.500	VESA	•
6	832 x 624	49.72	±	74.55	±	57.283	MAC	•
7	1024 x 768	48.36	-	60.00	-	65.000	VESA	•
8	1024 x 768	60.02	-	75.03	-	78.750	VESA	•
9	1024 x 768	68.68	+	85.00	+	94.500	VESA	X
10	1152 x 720	44.86	-	60.00	+	66.750	CVT 0.83MADVT 16:10	•
11	1152 x 870	68.68	±	75.06	±	100.000	MAC	•
12	1152 x 900	61.80	±	65.96	±	92.978	SUN	•
13	1280 x 768	47.396	+	60.0	-	68.25	CVT 0.98M9-R	•
14	1280 x 960	60.00	±	60.00	±	108.000	VESA	•
15	1280 x 1024	63.98	+	60.02	+	108.000	VESA	•
16	1280 x 1024	79.98	+	75.02	+	135.000	VESA	•
17	1280 x 1024	91.15	+	85.02	+	157.500	VESA	X
18	1440 x 900	55.94	-	59.89	+	106.500	CVT 1.30MA	•
19	1440x900	70.5	±	75	±	136.48	VESA	•
20	1600 x 1000	61.648	+	60.00	-	108.50	CVT 1.60MA-R	X
21	1600 x 1200	75.00	+	60.00	+	162.000	VESA	X
22	1600 x 1200	93.80	+	75.00	+	202.500	VESA	X
23	1680 x 1050	65.29	-	60.00	+	146.250	CVT 1.76MA	X
24	1920 x 1200	74.04	+	60.00	-	154.000	CVT 2.30MA-R	X
25	1920 x 1080	67.158	-	60.00	+	173.00	CVT2.07M9 16:9 DTV	X
26	1920 x 1200	74.56	-	60.00	+	193.250	CVT 2.30MA	X
Preset	Pixel Format	HorzFreq (kHz)	Horz Polarity	Vert Freq (Hz)	Vert Polarity	Pixel Clk (MHz)	Source	19W

NOTE: Modes 14 thru 16 are supported with scaled down video primarily to support navigation to a supported timing mode.

Operational & Functional Specification

Video performance

***All spec. of monitor need to warm up at least 1hr.**

Item	Condition	Spec	OK	N.A	Remark
Resolution	Any input resolution modes which are under 1440x900	1440 x 900	√		
Contrast ratio		800(Typ) , 600(Min)	√		Test Condition: Set Contrast at 50, Brightness at 100, Color at User preset.
Brightness	At R/G/B saturated condition	300 cd/m ² (typ.),250(min)	√		Test Condition: Set contrast at 100 , brightness at 100 , color at User preset.
Response time	Rising + Falling time	5 ms (typ.),8ms(max)	√		Test Equipment: Westar TRD 100 or equal level equipment ;
Response time with AMA	Average response time of gray level to gray level			√	Test Condition: Set Contrast at 50, Brightness at 90, Color at User preset.
Viewing angle	At Contrast ratio = 10	R/L: 80/80 degrees (typ.) 70/70 degrees (min)	√		
	At Contrast ratio = 10	U/D: 80/80 degrees (typ.) 70/70 degrees(min)	√		
CIE coordinate of White		(0.313, 0.329) +/- (0.03, 0.03)	√		
Display colors		16.7 Millions colors	√		RGB 6 bits + HiFRC

Brightness Adjustable Range

Item	Condition	Spec	OK	N.A	Remark
Brightness adjustable range	At default contrast level (saturate point) & Full-white color pattern	(Max. brightness value – Min. brightness value) $\geq 100 \text{ cd/m}^2$	√		

Acoustical Noise

Item	Condition	Spec	OK	N.A	Remark
Acoustical Noise	At 4cm distance & “Audio” function disabled	$\leq 28 \text{ dB/A}$	√		

Environment

Item	Condition	Spec	OK	N.A	Remark
Temperature	Operating	0 ~ +40 °C	√		
	Non-operating	-20 ~ +60 °C	√		
Humidity	Operating	10 ~ 90%	√		Non-condensing
	Non-operating	10 ~ 70%	√		Non-condensing
Altitude	Operating	0~3048m (10,000ft)	√		Without packing
	Non-operating	0~12,192m (40,000ft)	√		With packing

Transportation

Item	Condition	Spec	OK	N.A	Remark
(1) Vibration	Package, Non-Operating	(1) Sine wave 5~200Hz 1.5G, 1 octave/min, 15 min dwell on each resonant frequency, all primary axis, one sweep (30 min minimum) per orientation, total of 90+ min.	√		
		(2) Random 5 ~100 Hz, 0 dB/Oct. 0.015 g ² /Hz 100 ~200 Hz, -6 dB/Oct. 200 Hz, 0.0038 g ² /Hz Equivalent to 1.47 Grms, All primary axis, 20 min per- orientation, total is 60 min.			

		(3) Procedure: Confirmed sample with appearance and function ready before testing then compare with after test record as brightness, uniformity and contrast ratio. Perform random vibration after sine-wave vibration test.			
(2) Unpackaged Vibration	Unpackaged, Non-Operating	Test Spectrum: 20 Hz 0.0185(g2/Hz) 200Hz 0.0185(g2/Hz) Duration 5 Minutes Axis : 3 axis (Horizontal and Vertical axis ,Z axis)	√		
(3) Drop	Package, Non-Operating	91 cm Height (MP stage) (1 corner, 3 edges, 6 faces)	√		
(4) Shock	Wooden package, Non-Operating	Waveform: half sine Faces: 6 sides/ per orientation 3 shocks. Duration: <3ms Velocity accelerate: 75g	√		

Electrostatic Discharge Requirements

Item	Condition	Spec	OK	N.A	Remark
Electrostatic Discharge	IEC801-2 standard	Contact: 8KV Air: 15KV	√		

EMC

Item	Condition	Spec	OK	N.A	Remark
TCO03	Electric	Band 1 < 10 V/m Band 2 < 1 V/m	√		
	Magnetic	Band 1 < 200nT Band 2 < 25nT	√		
EMI	FCC part 15J class B	After Mass production under 1dpm for constant measure	√		
	EN55022 class B	Besides DNSF and VCCI class-2 are optional.	√		

Reliability

Item	Condition	Spec	OK	N.A	Remark
MTBF Prediction	Refer to MIL-217F	> 60,000 Hours	√		Excluding CCFL
CCFL Life time	At 25±2°C, under 6.0mA	40,000 Hours (min)	√		See Note-4

Note-4: CCFL lifetime is determined as the time at which brightness of lamp is 50%. The typical lifetime of CCFL is on the condition at 6.0mA lamp current.

Audio performance

Item	Condition	Spec	OK	N.A	Remark
Preamp + Power amp					
(1)Output power	@ 1KHz	1 Wrms/CH	√		
(2)THD	@ 1W 1KHz	<1%	√		
(3)S/N ratio		>40dB	√		
Speaker Driver					
(1)Nominal impedance	@ 1KHz	8 ± 15% ohm	√		
(2)Rated power		1W/CH	√		
(3)Frequency response	SPL-10dB	550~20KHz	√		
(4)Output sound pressure level	1W 0.5M	80 ± 3 dB	√		
(5)Dimension		37x17mm ²	√		
Audio Control					
(1)Volume range		0 ~100 levels	√		
(2)Mute		On/Off	√		

LCD Characteristics

The Physical definition & Technology summary of LCD panel

Item	Condition	Spec	OK	N.A	Remark
LCD Panel Supplier		AUO	√		
Panel type of Supplier		AUO M190PW01 V0	√		
Screen Diagonal		481.42mm (19" wide)	√		
Display area	Unit=mm	408.24(H) x 255.15(V)	√		
Physical Size	Unit=mm	428(W) x278 (H) x18.5 (D)(Typ)	√		
Weight	Unit=gram	2120 (Typ)	√		
Technology		TN type	√		
Pixel pitch	Unit=mm	0.2835(H) x 0.2835(W)	√		Per one triad
Pixel arrangement		R/G/B vertical stripe	√		
Display mode		Normally White	√		
Support color		16.7 Millions colors	√		RGB 6 bits + HiFRC

Optical characteristics of LCD panel

Item	Unit	Conditions	Min.	Typ.	Max.	Remark
Viewing Angle	[degree]	Horizontal (Right)	70	80	-	
	[degree]	CR = 10 (Left)	70	80	-	
	[degree]	Vertical (Up)	70	80	-	
	[degree]	CR = 10 (Down)	70	80	-	
Contrast ratio			600	800		
Response Time	[msec]	Rising Time	-	3.6	5.7	
	[msec]	Falling Time	-	1.4	2.3	
	[msec]	Rising + Falling	-	5	8	
Color / Chromaticity Coordinates (CIE)		Red x	0.620	0.650	0.680	
		Red y	0.310	0.340	0.370	

		Green x	0.260	0.290	0.320	
		Green y	0.580	0.610	0.640	
		Blue x	0.120	0.150	0.180	
		Blue y	0.040	0.070	0.100	
Color Coordinates (CIE) White		White x	0.283	0.313	0.343	
		White y	0.299	0.329	0.359	
Luminance Uniformity	[%]	9 points measurement	75	80		
White Luminance @ CCFL 6.0mA (center)	[cd/m ²]		250	300	-	
Crosstalk (in 75Hz)	[%]				1.5	
Flicker	[dB]				-20	

* The test methods for the above items' definition, please refer to the relative panel specification.

User Controls

User's hardware control definition

Item	Condition	Spec	OK	N.A	Remark
Power button			√		
Enter/Volume button			√		
Up/Inc. button			√		
Down/Dec. button			√		
Menu button			√		
Mode button			√		
Gaming Mode button				√	
Input Select button				√	
iKey button			√		
Mute button				√	

OSD control function definition

Item	Condition	Spec	OK	N.A	Remark
Auto Adjust		Auto-Geometry	√		
Brightness			√		Default: 90
Contrast			√		Default: 50
Horizontal Position			√		Default:50
Vertical Position			√		Default:50
Pixel Clock			√		Phase , clock no recall
Phase			√		Phase , clock no recall
Color		Bluish Reddish Normal User: Separate R/G/B adjustment	√		Default : Normal
OSD Position		OSD Horizontal position OSD Vertical position	√		Default: 50/50
OSD Time		From 5 sec to 30 sec	√		Default:15
OSD LOCK			√		Default:off
Language		8/14 languages for Asia/Europe Version	√		Default : English Language no recall
Reset All		Color recall Recall All	√		Phase , clock, language no recall

Mode	Standard / Movie / Dynamics / Photo/Racing Game/Action Game	√	Default :Standard
Input Select	D-sub DVI HDMI Component Composite S-Video	√	
Sharpness		√	default 3
Display Information	For input timing	√	
Volume		√	Default: 50
Mute		√	
Hot key for Brightness		√	
Hot key for Contrast		√	
Hot key for Volume		√	
Hot key for PIP Select			√
Hot key for Input Select		√	
Hot key for Mode		√	
Hot Key for Gaming mode			√

- The detailed firmware functions' specification, please refer to C212 S/W spec. document.

Mechanical Characteristics

Dimension

Item	Condition	Spec	OK	N.A	Remark
Bezel opening		339.8*272.2 mm	√		
Monitor without Stand	W x H x D mm	378.705*335.373*58.3mm	√		
Monitor with Stand	W x H x D mm	378.705*378.94*137.38mm	√		
Carton Box (outside)	L x W x H mm	438*434*110	√		
Tilt and Swivel range		Tilt: -5 ~ +20 degree Swivel: 0 degree	√		

Weight

Item	Condition	Spec	OK	N.A	Remark
Monitor (Net)		4.8 Kg	√		
Monitor with packing (Gross)		6.7 Kg	√		

Plastic

Item	Condition	Spec	OK	N.A	Remark
Flammability		>ABS<,94-HB	√		
Heat deflection To	ABS	65 °C	√		
UV stability	ABS	Delta E < 8.0	√		
Resin		MPRII: ABS (SD0150/GP35/D350/PA757)	√		

Texture		MT-11020	√		BZL partial texture MT-11010
Color		BCS-Y5003A	√		

Carton

Item	Condition	Spec	OK	N.A	Remark
Color		Kraft	√		
Material		C Flute	√		
Compression strength		377.3 KGF	√		
Burst Strength		16 KGF/cm ²	√		
Stacked quantity		17 Layers	√		

Pallet & Shipment

Container Specification

Stowing Type	Container	Quantity of products (sets) (Every container)	Quantity of Products (sets) (Every Pallet)	Quantity of pallet (sets) (Every Container)
With pallet	20'	792	Pallet A: 72	Pallet A: 10
			Pallet B: 36	Pallet B: 2
			Pallet C: --	Pallet C: --
			Pallet D: --	Pallet D: --
	40'	1656	Pallet A: 72	Pallet A: 22
			Pallet B: 36	Pallet B: 2
			Pallet C:--	Pallet C:--
			Pallet D:--	Pallet D:--
Without pallet	20'		X	X
			X	X
	40'		X	X
			X	X

Carton Specification

Product:

Net Weight (Kg)	Gross Weight (Kg)	Dimension w/o Base W*H*D (mm)	Dimension w/ Base W*H*D (mm)
4.8Kg	6.7	448.3*394.4*61	448.3*392.14*61

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Carton Interior Dimension (mm) L*W*H	Carton External Dimension (mm) L*W*H
505*439*130	515*140*455

Certification

Item	Condition	Spec	OK	N.A	Remark
Environment	Green design	API Doc: 715-C49	√		ISO14000 Requirement
	Blue Angel	German Standard	√		
	E-2000	Switzerland		√	
	EPA	USA Standard	√		
	TCO'99				
	TCO'03		√		
	Green Mark		√		
	Microsoft Windows	PC98/99	√		
	CEMS	Version 1.3	√		
	DDC 2B USB	External	√		
PC-Monitor Safety	UL (USA)	UL60950-1 1st Edition	√		
	CSA (Canada)	CAN/CSA-C22.2 No. 60950-1-03	√		
	Nordic / D.N.S.F	EN60950-1:2001+A11:2004		√	
	FIMKO	EN60950-1:2001+A11:2004	√		
	TUV-S	IEC60950-1:2001	√		
	CB	IEC60950-1:2001/EN60950-1:2001+A11:2004	√		
	NOM	IEC60950-1:2001/EN60950-1:2001+A11:2004	√		
	TUV/GS	EN60950-1:2001+A11 / EK1-ITB 2000:2007	√		
	CCC (China)	GB4943-2001/GB9254-1998/GB17625.1-2003	√		
	GOST	EN60950-2002	√		
EMC	SASO	IEC60950-1:2001	√		
	PSB	IEC60950-1:2001	√		
	CE Mark	89/336/EEC	√		
	FCC (USA)	FCC Part 15 B	√		
	EN55022	Class B	√		
	CISPR 22	Class B	√		
	VCCI (Japan)	VCCI Class B	√		
	BSMI (Taiwan)	CNS 13438	√		
	C-Tick (Australia)	AS/ NZS CISPR22	√		
	DHHS (21 CFR)	USA X- Ray Standard		√	
X- Ray Requirement	DNV		√		
	PTB	German X- Ray standard	√		
	TUV Ergo		√		
	ISO 13406-2		√		
Ergonomics	prEN50279			√	

3.2. Customer Acceptance

3.2.1. SCOPE

This document establishes the general workmanship standards and functional Acceptance criteria for LCD color monitor model G900W Produced by BenQ Corporation.

3.2.2. PURPOSE

The purpose of this publication is to define a procedure for inspection of the LCD monitor by means of a customer acceptance test, the method of evaluation of defects and rules for specifying acceptance levels.

3.2.3. APPLICATION

The "Customer Acceptance Criteria" is applicable to the inspection of the LCD monitor, completely packed and ready for dispatch to customers. **Unless otherwise specified, the customer acceptance inspection should be conducted at manufacturer's site.**

3.2.4. DEFINITION

The "Customer Acceptance Criteria" is the document defining the process of examining, testing or otherwise comparing the product with a given set of specified technical, esthetic and workmanship requirements leading to an evaluation of the "degree of fitness for use", including possible personal injury or property damage for the user of the product.

3.2.5. CLASSIFICATION OF DEFECTS

The defects are grouped into the following classes:

Critical defect

A critical defect is a defect that judgment and experience indicate is likely to result in hazardous or unsafe conditions for individuals using, maintaining or depending upon the product.

Major defect

A major defect is a defect, other than critical, that is likely to result in failure, or to reduce materially the usability of the product for its intended purpose.

Minor defect

A minor defect is a defect that is not likely to reduce materially the usability of the product for its intended purpose, or is a departure from established standards having little bearing on the effective use of operation of the product.

3.2.6. CLASSIFICATION OF DEFECTIVES

A defective is a product which contains one or more defects. The defective will be classified into following classes:

Critical defective

A critical defective contains one or more critical and may also contain major and/or minor defects.

Major defective

A major defective contains one or more defects and may also contain minor defects but contains no critical defect.

Minor defective

A minor defective contains one or more minor defects but contains no critical and major defects.

3.2.7. EXPRESSION OF DEFECTIVES

Number of defects
Percent of defects = ----- X 100%
Number of products inspected

3.2.8. INSPECTION STANDARD

Unless otherwise specified, the inspection standard will be defined by MIL- STD-105E(ISO-2859), SINGLE SAMPLING PLAN. level II is in use all the time , inspection levels are normal ,reduce and tighten .

Acceptance Quality Level

When a critical defect is found, this must be reported immediately upon detection, the lot or batch shall be rejected and further shipments shall be held up pending instructions from the responsible person in relevant organization.

Major Defective: 0.4 AQL
Minor Defective: 1.50 AQL

3.2.9. GENERAL RULES

The inspection must be carried out by trained inspectors having good knowledge of the meaning of "fitness for use". The inspection must be based upon the documents concerning the completely assembled and packed product When more defects appear with the same cause only the most serious defect must be taken into account. Defects found in accessories packed with the product as connecting cables, plugs, adapters and the like, and being inspected as a part of the complete product, must be included in the evaluation.

The evaluation must be within the limits of the product specification and, for not specified characteristics, be related to the design model, limit samples or judgment of a jury of experts.

Faults must be demonstrable.

3.2.10. TEST CONDITIONS

Unless otherwise prescribed, the test conditions are as follows:

- . Nominal mains voltage
- Temperature: +5~+35°C
- . Warm up time : 30minutes minimum .
- . Visual inspection shall be down with the distance from eyes to the sample 35-50 cm .
- . Display mode: Primary mode 1280*1024

3.2.11. TEST EQUIPMENTS

1. PC with display adapter or other specific display adapter which is agreed upon by both parties
2. Test program by BenQ
3. Ruler
4. Power saving test tool

3.2.12. VISUAL INSPECTION CRITERIA

1. PACKING
2. ACCESSORIES
3. APPEARANCE
4. AC POWER AND SIGNAL CABLE
5. INTERIOR OF THE PRODUCT

No	Description	Class
1	Packing	
1.1	Wrong packing material	Major
1.2	Carton damaged(over 6cm dia).wet, badly taped or stapled, product will not arrive in good condition at customer	Minor
1.3	Carton damaged(3cm to 6cm dia), badly taped or stapled , product will arrive in good condition at customer	Minor
1.4	Wrong marking of trade mark	Major
1.5	Wrong marking of model number	Major
1.6	Wrong serial # marking on carton	Major
1.7	Product wrongly placed in box (upside down)	Major
1.8	Broken polyfoam or PU foam	Major
1.9	Broken packing bag	Major
1.10	Wrong size or poor printing for artwork/character	Major
1.11	Bar-code wrong, missing, or damaged	Major
1.12	Label on box missing or damaged	Major
1.13	Strange object in the box	Major
1.14	Unit not corresponding to model stated on external label	Major
1.15	Superficial breaking 5 ~ 10 cm dia	Minor
2	Accessories	
2.1	Missing accessory parts	Major
2.2	Wrong Accessory parts	Major
3	Appearance of product	
3.1	Incorrect color of cabinet	Major
3.2	Incorrect color of tilt/swivel base	Major
3.3	Wrong logo or name plate	Major

No	Description	Class
3.4	Poor print of logo or name plate	Major
3.5	Label on product Wrong or missing	Major
3.6	Scratched or dirty but legible spec. label	Minor
3.7	GAP between LCD and front bezel is over 2.0 mm	Major
3.8	Dot/area discolor over 1mm dia. in front or over 2mm dia. in other areas	Major
3.9	Cabinet warped, sagged or bulging >0.5% of surface length	Major
3.10	Cabinet warped, sagged or bulging noticeable but <0.5% of surface length	Minor
3.11	Sharp stud or edge, which can cause damage not safe	Major
3.12	Finishing of piece parts will not arrived in good condition at the customer	Major
3.13	Cabinet step (between housing and bezel) > 1.0mm , < 1.5mm	Minor
3.14	Cabinet step (between housing and bezel) > 1.5mm	Major
3.15	Wiring or fixing cord comes out of cabinet or jammed	Major
3.16	Auxiliary material used during production not removed	Major
3.17	Cabinet parts come loose during normal handling, not safe	Critical
3.18	Cabinet parts come loose during normal handling, but safe	Major

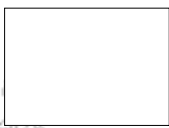
3.19	Tilt/swivel too flexible/not working	Major
3.20	Tilt/swivel stiff	Minor
3.21	Dirty front bezel and housing can't remove	Major
3.22	Dirty front bezel and housing removable easily	Minor
3.20	Sticker or loose user control switch which will not function correctly	Major
3.21	Missing knob or switch, not safe	Critical
3.23	Missing knob or switch, but safe	Major
3.24	Poor functional user controls in mechanical	Major
3.25	Unreadable printing of user controls label	Major
3.26	Rubber foot missing	Major
3.27	LED wrong material or missing	Major
3.28	LED sagged >1.0mm or bulging>0.5mm	Minor
3.29	Wrong S/N between spec. label and monitor display	Major
4	AC power and signal cable	
4.1	AC power or connector not correct or damaged, not safe	Critical
4.2	AC power or connector not correct or damaged, but safe	Major
4.3	Signal cable contact pin dirty	Minor
4.4	Signal cable plug dirty or surface damaged, but safe	Minor
4.5	Cable crack	Major
4.6	Cable scratch (wire not exposed), or dirty	Major

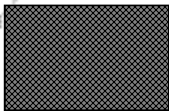
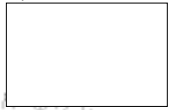
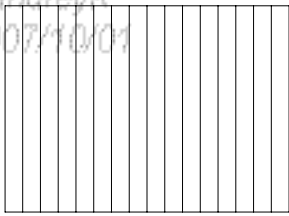
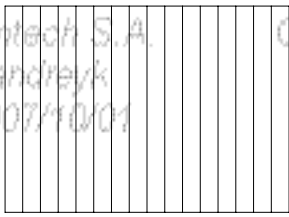
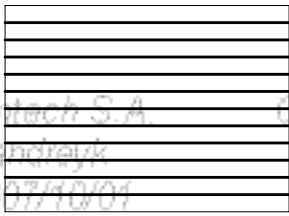
No	Description	Class
4.7	AC-DC adapter no function	Minor
4.8	Signal cable contact pin dirty	Major
5	Interior of the product	
5.1	Use Non-QVL (Qualify vendor list)component	Major
5.2	Wrong parts, broken component, but safe	Major
5.3	Foreign material	
	Conductive (Has potential to short circuit)	Major
	Non-conductive (Moveable)	Minor
5.4	Missing hardware, component or screw, stripped screw	Major
5.5	Loose hardware/screw or insufficient torque	Major
5.6	Poor wire routing, which is no concerned on EMI	Minor
5.7	Cold soldering/loose connections (Electrical)	Major
5.8	Wires and mechanical structure do not meet UL/CSA or TUV	Critical
5.9	Wrong parts, broken component, not safe	Critical
5.10	Component burn	Critical

3.2.13. OPERATIONAL INSPECTION CRITERIA

1. TEST PATTERN
2. SPECIFICATIONS
3. OPERATIONAL INSPECTION CRITERIA

3.2.13.1.List of test pattern

KEY	PATTERN	TEST ITEM
A	FULL WHITE 	H - Size , V – Size .Viewing Angle Light Output Impurity, Spot check Contrast Ratio Brightness adjust Range

E	DARK		Background, Spot check
F	FULL W , R , G , B		Impurity, Spot check .CIE Coordinate check
G	256 COLORS		Color Check
H	16 GREY		Gray Check
H	Black/White stripe pattern		Electric characteristics

3.2.13.2. Video performance

Item	Condition	Spec	OK	N.A	Remark
Max. support Pixel rate		165 MHz	√		
Max. Resolution		1680 x 1050	√		
Rise time + Fall time		≤ 3.1 ns (50% of minimum pixel clock period)	√		1680 x 1050 @ 60Hz (max. support timing)
Settling Time after overshoot /undershoot		< 5% final full-scale value	√		Refer to VESA VSIS Standard V1R1
Overshoot/Undershoot		< 12% of step function voltage level over the full voltage range	√		Refer to VESA VSIS Standard V1R1

3.2.13.3. Support Timings

Input Timing					Actual Output				
Resolution	Horizontal Frequency (KHz)	Vertical Frequency (Hz)	Dot Clock Frequency (MHz)	Actual display Resolution	OK	N.A	Remark		
640x350	31.47(P)	70.08(N)	25.17	1280x943	√		DOS		
720x400	31.47(N)	70.08(P)	28.32	1280x1024	√		DOS		
640x480	31.47(N)	60.00(N)	25.18	1280x1024	√		DOS		
640x480	35.00(N)	67.00(N)	30.24	1280x1024	√		Macintosh		
640x480	37.86(N)	72.80(N)	31.5	1280x1024	√		VESA		
640x480	37.50(N)	75.00(N)	31.5	1280x1024	√		VESA		
800x600	37.88(P)	60.32(P)	40.00	1280x1024	√		VESA		
800x600	48.08(P)	72.19(P)	50.00	1280x1024	√		VESA		
800x600	46.86(P)	75.00(P)	49.50	1280x1024	√		VESA		
832X624	49.72(N)	74.55(N)	57.29	1280x1024	√		Macintosh		
1024x768	48.36(N)	60.00(N)	65.00	1280x1024	√		VESA		
1024x768	56.48(N)	70.10(N)	75.00	1280x1024	√		VESA		
1024x768	60.02(P)	75.00(P)	78.75	1280x1024	√		VESA		
1024X768	60.24(N)	74.93(N)	80.00	1280x1024	√		Macintosh		
1152x864	67.50(P)	75.00(P)	108.00	1280x1024	√		VESA		
1152x870	68.68(N)	75.06(N)	100.00	1280x1024	√		Macintosh		
1152x900	61.80(N)	66.00(N)	94.50	1280x1024	√		SUN 66		
1152x900	71.81(N)	76.14(N)	108.00	1280x1024	√		SUN		
1280x1024	64.00(P)	60.00(P)	108.00	1280x1024	√		VESA		
1280x1024	75.83(N)	71.53(N)	128.00	1280x1024	√		IBM1		
1280x1024	80.00(P)	75.00(P)	135.00	1280x1024	√		VESA		
1280x1024	81.18(N)	76.16(N)	135.09	1280x1024	√		SPARC2		
1680x1050	75	60	162	1680x1050	√		VESA		

Note-3: “P”, “N” stands for “Positive”, “Negative” polarity of incoming H-sync/V-sync (input timing).

3.2.14. PANEL INSPECTION CRITERIA

Inspection Item	Specification
Line defect	Can't be seen
Bright Dot	≤ 2 dots
Green bright dots	≤ 2 dots
Dark dots	≤ 4 dots
Total dots defect	≤ 5 dots
Continuous Defect	Two continuous bright dots(vertical ,horizontal, oblique): ≤ 1 pair Exclude continuous green-green bright dots
	Three or more continuous bright dots (vertical, horizontal ,oblique):Not allowed
	Two continuous dark dots(vertical ,horizontal, oblique): ≤ 2 pairs
	Three or more continuous dark dots(vertical, horizontal, oblique):Not allowed
	Distance between 2B dots: ≥ 15 mm Distance between 2Ddots: ≥ 15 mm Distance between B and D dot : ≥ 10 mm

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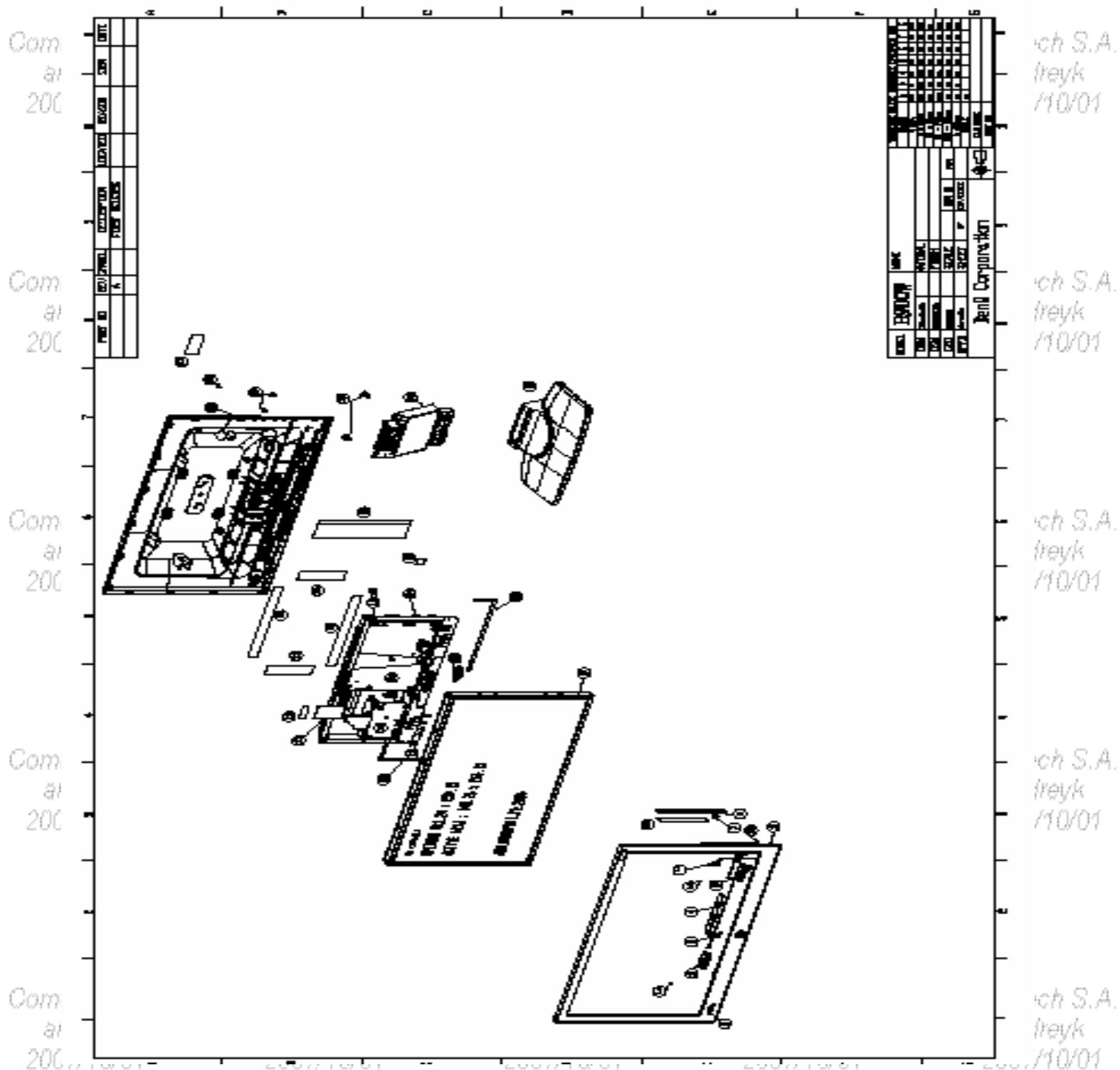
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4. Disassembly / Assembly

4.1. Exploded View






4.2. Disassembly /Assembly

E900WA DISASSEMBLY FLOW

Preparation before disassembly:

- 1.Clean the room for disassembly;
- 2.Checking the position that the monitors be placed;
- 3.Prepare the implement, equipments as bellow:

- ①forklift
- ②working table
- ③electronic screwdriver
- ④static-free pad
- ⑤glove
- ⑥pinafore

Item	Operation	Tool	Picture	Notes
1	Put the monitor on the working table.	static-free pad		The static-free pad must be cleaned.
2	Disassembling the Singal Cable.	electronic screwdriver ("+")		Torque:1.2±0.3kg
3	Disassembling the column.	electronic screwdriver ("+")		Torque:9±1.0kg

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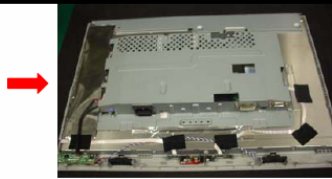

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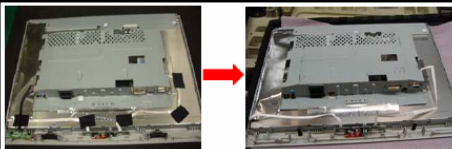
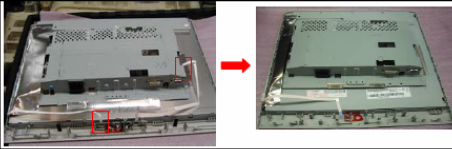



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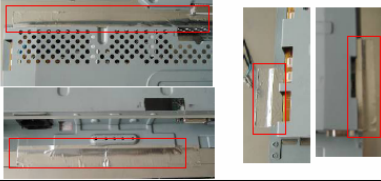
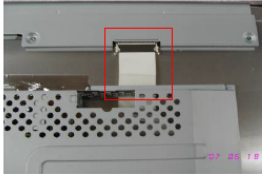
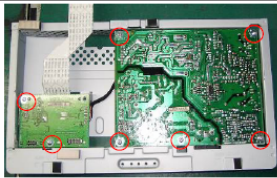
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4	Unscrew the screws of the backboard (1)	electronic screwdriver ("+")		Torque:6.0±1.0kg
5	Unscrew the screws of the backboard (2)	electronic screwdriver ("+")		Torque:5±1.0kg
6	unclose the BZL from the monitor with hand			
7	Disassembling the backboard from BZL.			
8	Take off the Ace Tape from panel			

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9	Disassembling the jack-board and SPK from BZL. ①:Pull out the wire from Power BD ②:Disassembling the jack-board ③:Take off the jack-board and SPK from BZL.	electronic screwdriver ("+")		Remark: MODEL ACE/A8E must do this station,MODEL ASE no need
10	Disassembling the Led-board from BZL. ①:Pull out the wire from I/F BD ②:Pull out the wire from LED BD ③:Take off the Led-board from BZL.			
11	Disassembling the control-board from BZL.			
12	Take off the big AL tape from panel			
13	Pull out the lighting wire from Power BD ①:Take off the Ace Tape for lighting wire from panel ②:Pull out the lighting wire from power BD			

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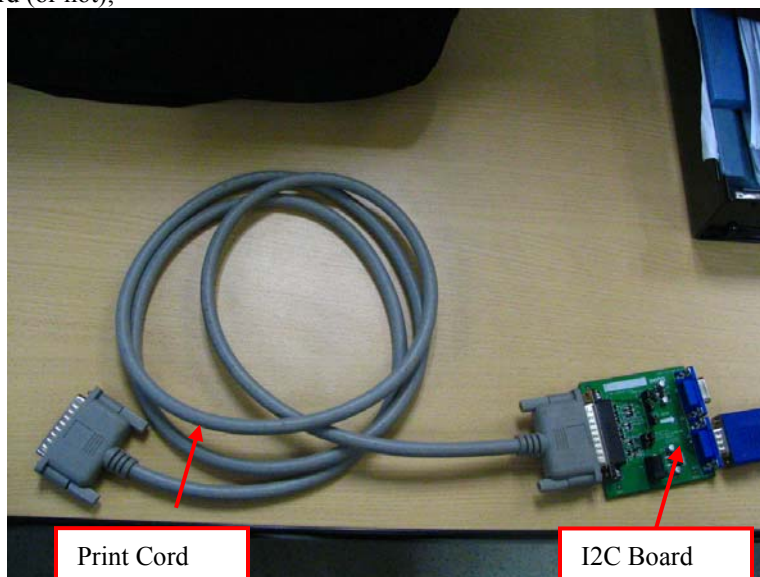
Comtech S.A. andreyk 2007/10/01	14	Unscrew the screw	electronic screwdriver ("+")		Torque:5±0.6kg Remark: MODEL ASE/ACE must be unscrew four screws, MODEL A8E must be unscrew two screws	Comtech S.A. andreyk 2007/10/01
Com ai 200	15	Take off four AL tapes				Comtech S.A. andreyk 2007/10/01
	16	Take off LVDS wire				
Com ai 200	17	Unscrew the screw	electronic screwdriver ("+")		Torque:6-8kg	Comtech S.A. andreyk 2007/10/01

5. Level 1 Cosmetic / Appearance / Alignment Service

5.1 Software / Firmware Upgrade Process

5.1.1. Hardware prepared:

- a. Print Board (or not);



- b. I2CBoard.

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And I2C Board Jump wire should follow **J10 (short), J9 (open), J8/J7/J6/J5 (3 and 2 pin short)**

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Connected to print
cord and PC

Connected to Display
Signal Cable

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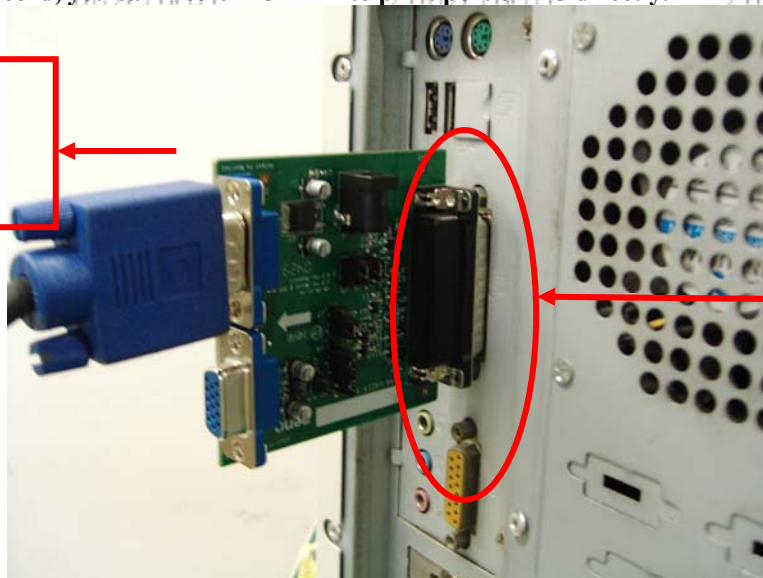
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If you have no print cord, you can insert I2C BD into print port on PC directly.

Connect to
LCD
Monitor

PC Print port



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5.1.2. Software Prepare:
Please set up attached Myson ISP software.
Operation sequence as following:

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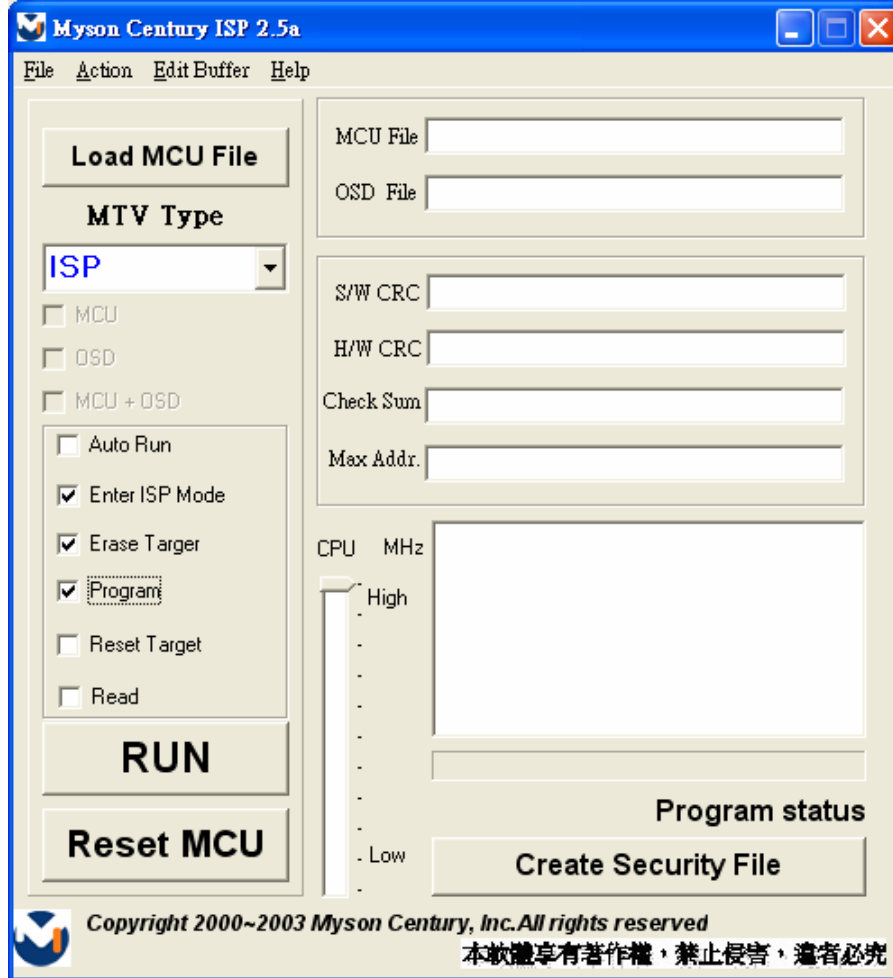
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a. Open the execute file and enter into software operation surface.



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b. Select MTV512M64 as your ISP Type

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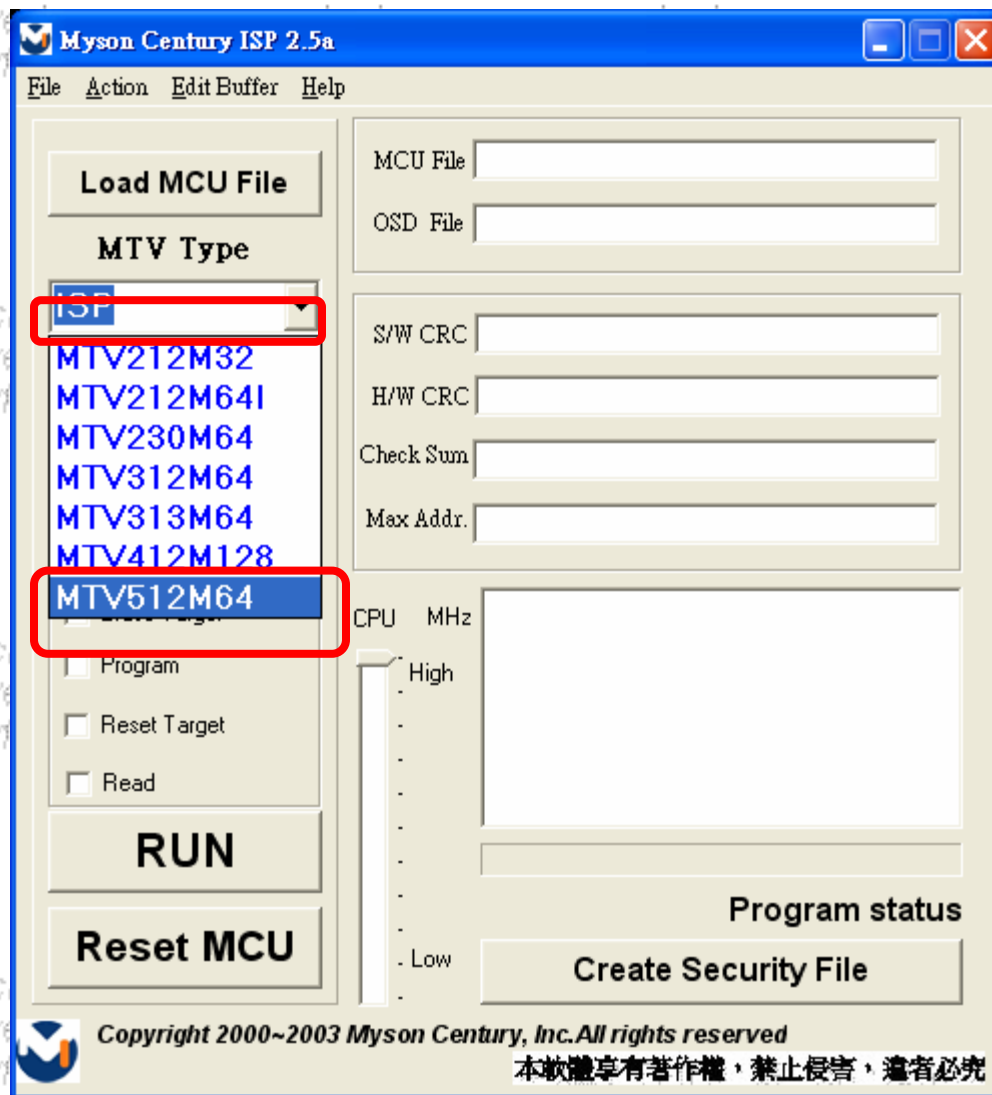
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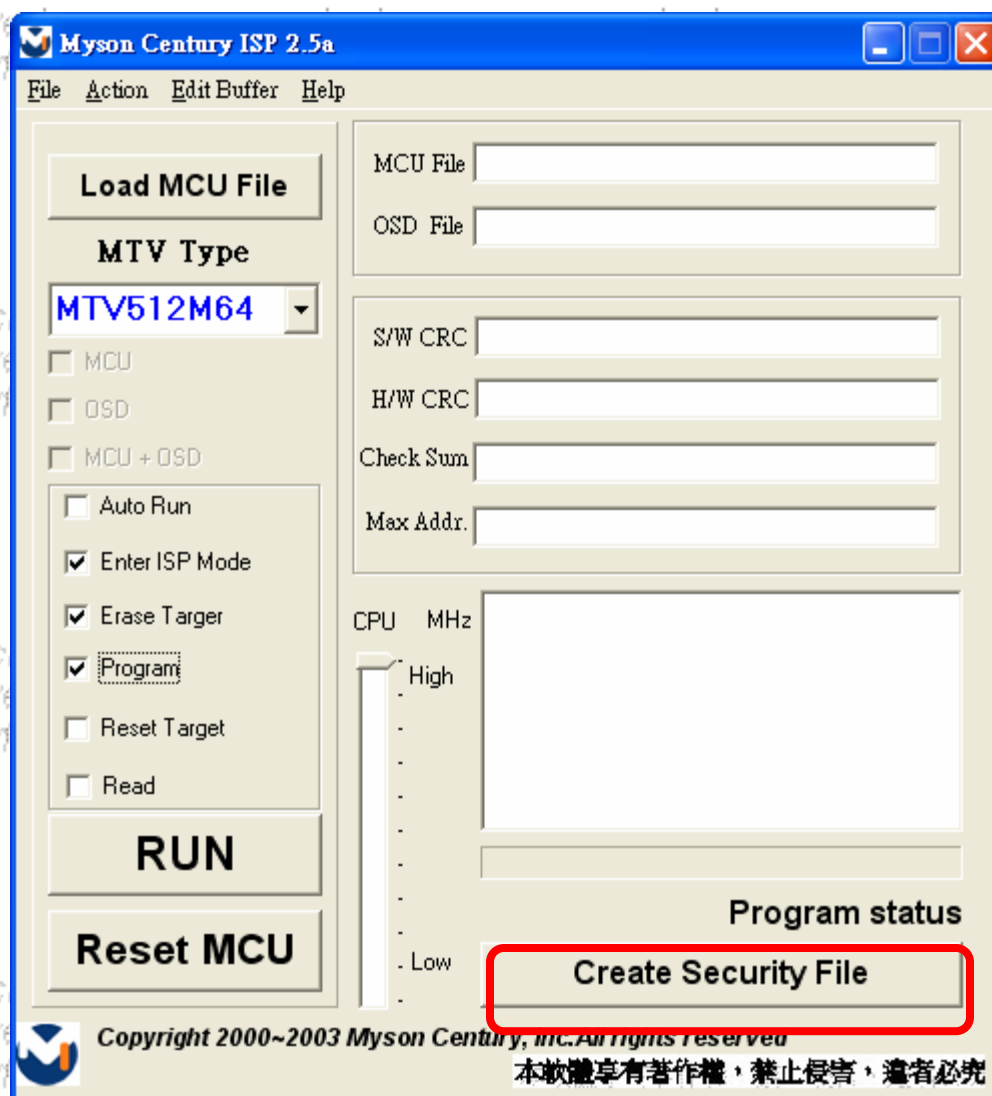
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c. Click "Create Security File " and input commands



Security

ISP Slave Add.	94	0x00 - 0xFF
SlaveB Add.	94	0x00 - 0xFF
Command 1	ac	0x00 - 0xFF
Command 2	ca	0x00 - 0xFF
Command 3	53	0x00 - 0xFF
Command 4		0x00 - 0xFF
Command 5		0x00 - 0xFF
Command 6		0x00 - 0xFF
Command 7		0x00 - 0xFF
Command 8		0x00 - 0xFF
Command 9		0x00 - 0xFF
Command 10		0x00 - 0xFF
Command 11		0x00 - 0xFF
Command 12		0x00 - 0xFF
Command 13		0x00 - 0xFF
Command 14		0x00 - 0xFF
Command 15		0x00 - 0xFF

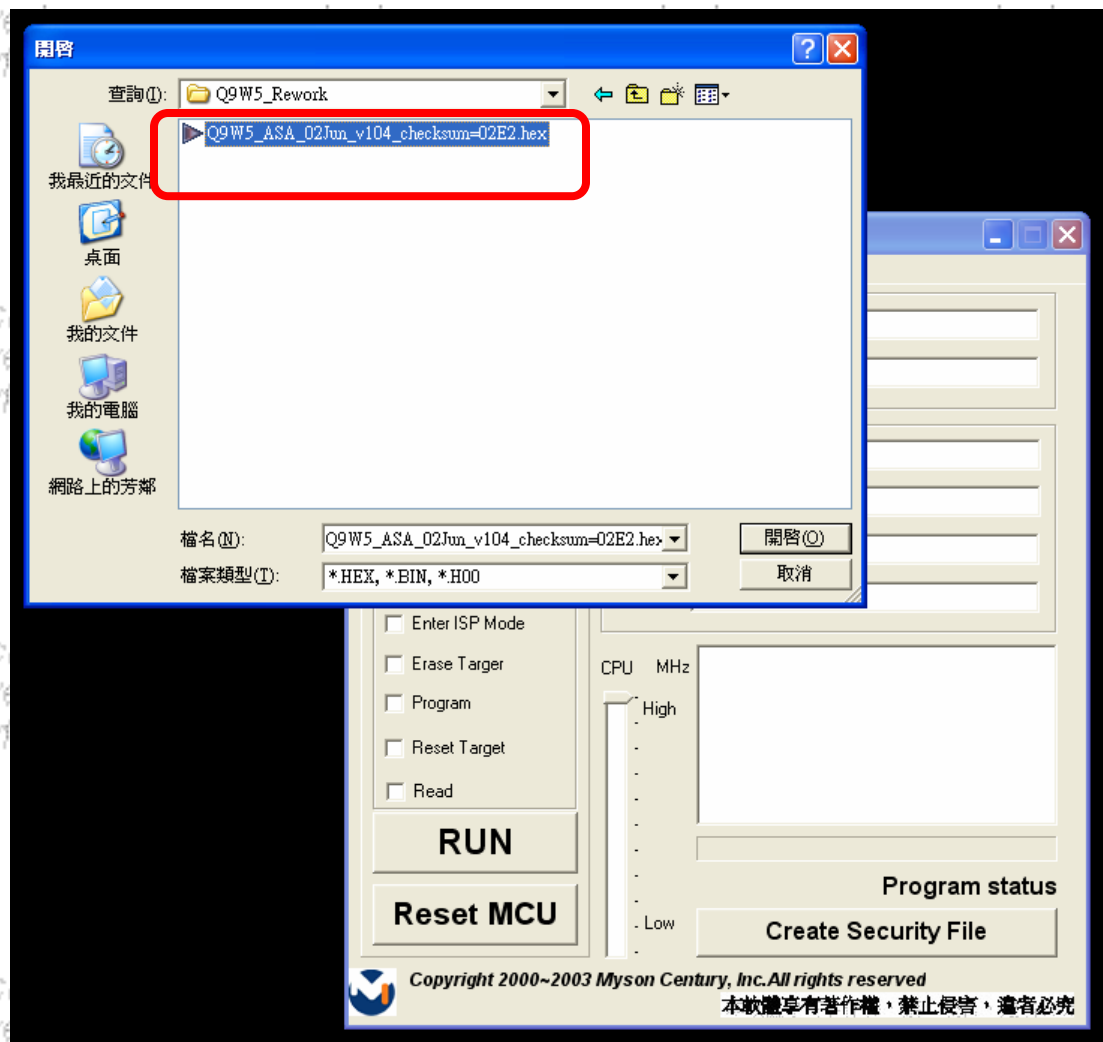
Command No

4

OK

CLEAR

d. Click "Load MCU File" and select your object file



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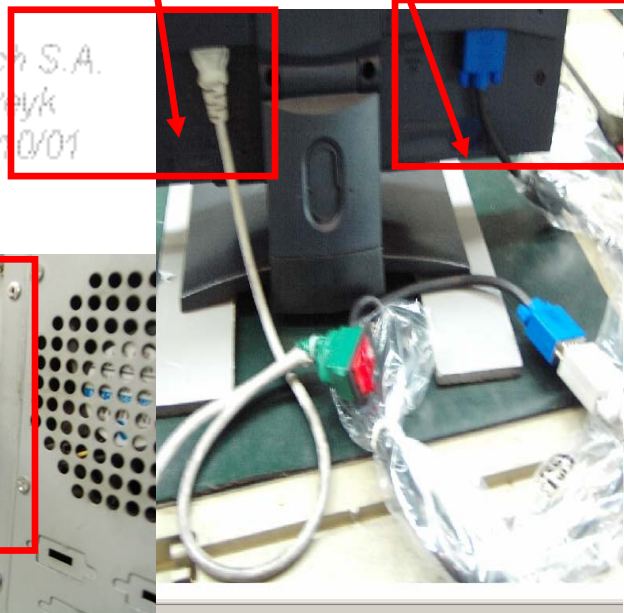
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e. Follow the follow steps in turn :

①. link “I2C BD & power cable & signal cable”.

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f. Click “Run” icon for updating firmware.

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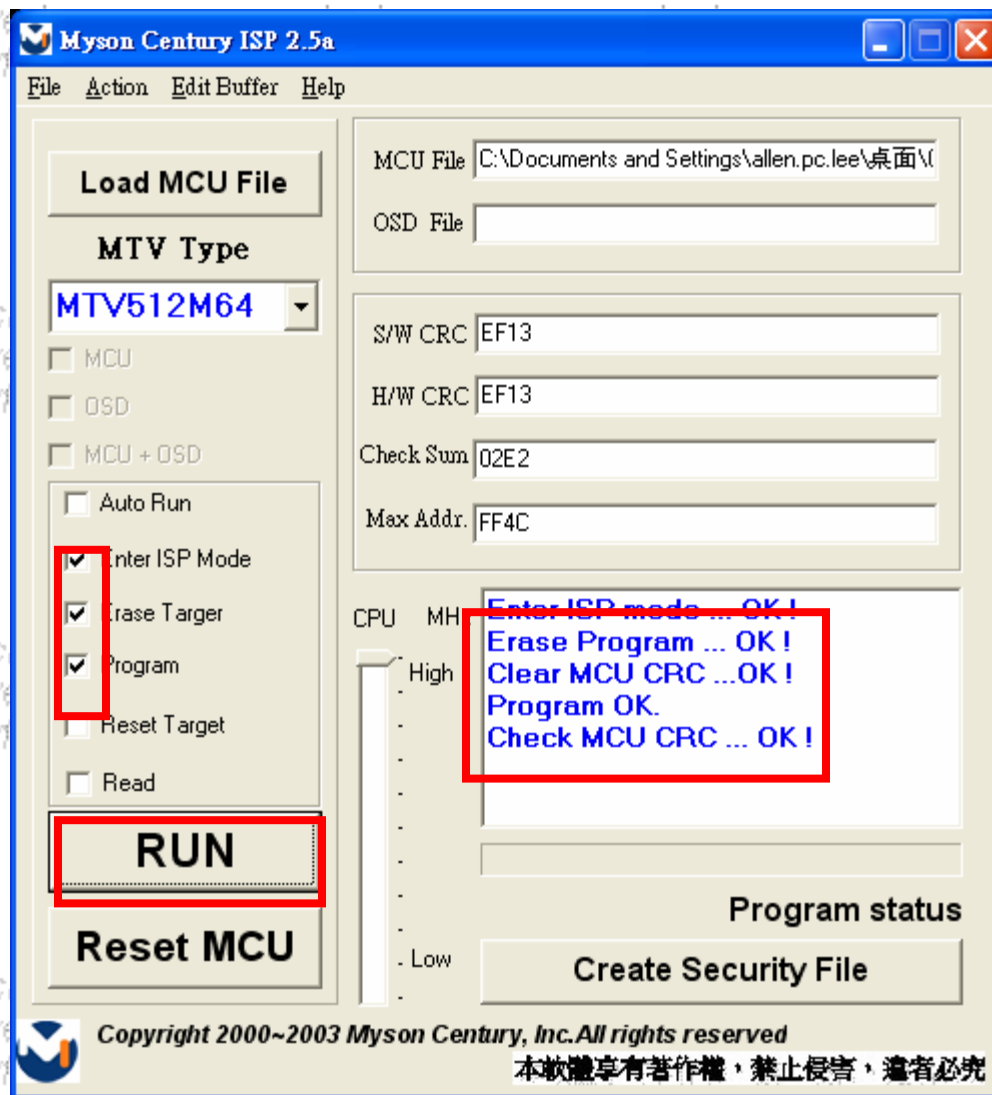
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5.2. Alignment procedure (for function adjustment)

A. Preparation

- 1.) Setup **input** timing to any preset modes or patterns.
- 2.) **Enter factory mode** (press “Menu” & “Auto” & “Power” buttons at the same time to turn on monitor).
- 3.) Move cursor into “Burn-in Mode” tag and select “On” to **enable burn-in mode**.
- 4.) Power off the monitor, remove the input source and then power on again.
- 5.) Setup unit and **keep it warm up for at least 30 minutes**.
- 6.) Setup input timing ICL-605(1280x1024@75Hz), 32-Grays pattern.
- 7.) Setup unit and keep it warm up at least 30 minutes.

B. Timing adjustment:

1. Enter factory setting area (press “ENTER”, “MENU” and then press “SOFTPOWER”).
2. Check the settings to following values:
Contrast = 50
Brightness = 90
Color = Normal
Language = English
Then, turn off the monitor power.
3. Turn on power enter user area.

Figure-1: Preset Timing modes list

Preset	Pixel Format	HorzFreq (kHz)	Horz Polarity	Vert Freq (Hz)	Vert Polarity	Pixel Clk (MHz)	Source	19W
1	640 x 480	31.47	-	59.94	-	25.175	VGA	●
2	640 x 480	37.50	-	75.00	-	31.500	VGA	●
3	720 x 400	31.47	-	70.08	+	28.321	VGA	●
4	800 x 600	37.88	+	60.32	+	40.000	VESA	●
5	800 x 600	46.88	+	75.00	+	49.500	VESA	●
6	832 x 624	49.72	±	74.55	±	57.283	MAC	●
7	1024 x 768	48.36	-	60.00	-	65.000	VESA	●
8	1024 x 768	60.02	-	75.03	-	78.750	VESA	●
9	1024 x 768	68.68	+	85.00	+	94.500	VESA	X
10	1152 x 720	44.86	-	60.00	+	66.750	CVT 0.83MADVT 16:10	●
11	1152 x 870	68.68	±	75.06	±	100.000	MAC	●
12	1152 x 900	61.80	±	65.96	±	92.978	SUN	●
13	1280 x 768	47.396	+	60.0	-	68.25	CVT 0.98M9-R	●
14	1280 x 960	60.00	±	60.00	±	108.000	VESA	●
15	1280 x 1024	63.98	+	60.02	+	108.000	VESA	●
16	1280 x 1024	79.98	+	75.02	+	135.000	VESA	●
17	1280 x 1024	91.15	+	85.02	+	157.500	VESA	X
18	1440 x 900	55.94	-	59.89	+	106.500	CVT 1.30MA	●
19	1440x900	70.5	±	75	±	136.48	VESA	●
20	1600 x 1000	61.648	+	60.00	-	108.50	CVT 1.60MA-R	X
21	1600 x 1200	75.00	+	60.00	+	162.000	VESA	X
22	1600 x 1200	93.80	+	75.00	+	202.500	VESA	X
23	1680 x 1050	65.29	-	60.00	±	146.250	CVT 1.76MA	X
24	1920 x 1200	74.04	+	60.00	-	154.000	CVT 2.30MA-R	X
25	1920 x 1080	67.158	-	60.00	+	173.00	CVT2.07M9 DTV 16:9	X
26	1920 x 1200	74.56	-	60.00	+	193.250	CVT 2.30MA	X

Note-3: “P”, “N” stands for “Positive”, “Negative” polarity of incoming H-sync/V-sync (input timing).

C. ADC calibration (Auto color balance adjustment)

~Analog only, it is not required for DVI-D input source

1. Setup input timing ICL-605(1280x1024@75Hz), pattern 42(5-Mosaic pattern with white color block) with Analog signals from Chroma video pattern generator. (it depends on Scaler IC supplier's recommendation)
2. Enter factory mode (press “Menu” & “Auto” & “Power” buttons at the same time to turn on monitor).
3. Move cursor into “Burn-in Mode” tag and select “On” to enable burn-in mode.
4. Close OSD menu then press “+” button for auto color adjustment. (This procedure will get optimal gain/offset(clamp) values)
5. Checking if the picture is ok, or reject this monitor and check its circuit board or wire/cable connection.

D. Color temperature adjustment

1. Setup input timing to any preset modes, **pattern 41**(full white color pattern) with **Analog** signals from Chroma video pattern generator.
2. **Enter factory mode** (press “Menu” & “Auto” & “Power” buttons at the same time to turn on monitor).
3. Move cursor into “Burn-in Mode” tag and select “On” to **enable burn-in mode**.
4. **Make sure ADC calibration** (auto color balance adjustment) **had already been done**.
5. Measure color temperature by Minolta CA-110 (or equivalent equipment).
6. Adjust the color temperature ~ Two methods can be used to adjust RED, GREEN, BLUE value of each color temperature, **C1/Normal, C2/Blue & C3/Red** to meet following spec requirement, the 1st method is by using external PC and IIC alignment protocol to do automatic adjustment, and the 2nd method is by manually and must be in factory mode.

Note* Color temperature specification

Color mode	Color temperature	x	y	
Normal	6500k	0.313±0.015	0.329±0.015	Min 220 cd/m2
Bluish	9300k	0.283±0.015	0.297±0.015	Min 180 cd/m2
Reddish	5800k	0.326±0.015	0.342±0.015	Min 220 cd/m2
User Mode	Panel default color temp.			Min 250 cd/m2
sRGB	6500k (Gamma=2.2±0.2)	0.313±0.01	0.329±0.01	200+/-20 cd/m2

Note** Picture mode definition: BenQ Senseye color definition V1.04

7. Move cursor into “Burn-in Mode” tag and select “No” to disable burn-in mode.
8. Turns off the monitor power.

E. Writing EDID data into monitor

1. Setup a PC with DDC card.
2. Connect PC to monitor with a D-sub signal cable.
3. Please refer to the C212 for the correct EDID file.
4. Runs the writing program to write the **analog EDID data** into EEPROM for **analog input**(ie. 15-pin D-sub).
5. Repeat step 4 and write the **digital EDID data** into EEPROM for **DVI-D input**(ie. 24-pin DVI-D).
6. Read both EEPROM data and confirm it to match with the C212 definition.

(Note : The DVI-D input may not operation correctly if the digital EDID data do not exist.)

F. Command definition

PC Host will send 0x7C IIC slave address and then following 4 bytes command

I2C Send Command	Byte1	Byte2	Byte3	Byte4	OK	N.A.	Note
Write Contrast to MCU RAM	CA	55	Data	cksum	√		Write data to MCU RAM and update the related register to refresh the screen immediately. Don't store data to EEPROM.
Write Brightness to MCU RAM	CA	56	Data	cksum	√		
Write Red Gain to MCU RAM	CA	57	Data	cksum	√		
Write Green Gain to MCU RAM	CA	58	Data	cksum	√		
Write Blue Gain to MCU RAM	CA	59	Data	cksum	√		
Write Brightness default	CA	9C	Data	cksum	√		Set brightness default of PWM(may not match OSD) <Note H>

Read Contrast from MCU RAM	C3	55	XX	cksum	√		
Read Brightness from MCU RAM	C3	56	XX	cksum	√		
Read Red Gain from MCU RAM by color index	C3	57	XX	cksum	√		
Read Green Gain from MCU RAM by color index	C3	58	XX	cksum	√		Base on current color index to read back the right gain value.
Read Blue Gain from MCU RAM by color index	C3	59	XX	cksum	√		
Read F/W version from MCU's constant definition	C3	5A	XX	cksum	√		Please see <Note F> for detail implementation
Read panel vender from MCU's constant definition	C3	5B	XX	cksum	√		Please see <Note G> for detail implementation
Read Product ID	C3	5C	XX	cksum	√		Reply EDID(analog if dual inputs) address 0A
Read Brightness default	C3	9C	XX	cksum	√		Set brightness default of PWM(may not match OSD) <Note H>
Write C1 (Bluish) R-Gain Data to EEPROM	AA	3C	Data	cksum	√		
Write C1 (Bluish) G-Gain Data to EEPROM	AA	3D	Data	cksum	√		
Write C1 (Bluish) B-Gain Data to EEPROM	AA	3E	Data	cksum	√		
Write C2 (sRGB) R-Gain Data to EEPROM	AA	4C	Data	cksum	√		
Write C2 (sRGB) G-Gain Data to EEPROM	AA	4D	Data	cksum	√		
Write C2 (sRGB) B-Gain Data to EEPROM	AA	4E	Data	cksum	√		
Write C3 (Reddish) R-Gain Data to EEPROM	AA	5C	Data	cksum	√		
Write C3 (Reddish) G-Gain Data to EEPROM	AA	5D	Data	cksum	√		
Write C3 (Reddish) B-Gain Data to EEPROM	AA	5E	Data	cksum	√		
Write User R-Gain Data to EEPROM	AA	6C	Data	cksum	√		
Write User G-Gain Data to EEPROM	AA	6D	Data	cksum	√		
Write User B-Gain Data to EEPROM	AA	6E	Data	cksum	√		
Write sRGB R-Gain Data to EEPROM	AA	7C	Data	cksum	√		
Write sRGB G-Gain Data to EEPROM	AA	7D	Data	cksum	√		Reserved for some model have extra color temperature
Write sRGB B-Gain Data to EEPROM	AA	7E	Data	cksum	√		
Write Contrast to EEPROM	AA	92	Data	cksum	√		
Write Brightness to EEPROM	AA	93	Data	cksum	√		
Write C/T index to EEPROM	AA	94	1~4	cksum	√		1=C1/9300/Bluish, 2=C2/6500/sRGB/, 3=C3/5800/Reddish, 4=User, 5=sRGB
Write OSD-Hpos to EEPROM	AA	95	Data	cksum	√		
Write OSD-Vpos to EEPROM	AA	96	Data	cksum	√		
1.1.1.1.2 For excluding BenQ model							0=EN, 1=ES, 2=FR, 3=DE, 4=簡中, 5=繁中
Write Language to EEPROM	AA	97	0~7	cksum	√		(Also Update MCU RAM)
1.1.1.2.1 For BenQ model							0=DE, 1=EN, 2=ES, 3=FR, 4=IT, 5=JA, 6=繁中, 7=簡中
Write Language to EEPROM (For Asia)	AA	97	0~7	cksum	√		

(Change Language type first) 0=EN, 6=French, 7=Deutsch, 8=Italian, 9=Spanish, 0A=Hungarian, 0B=Serbian, 0C=Russian, 0D=Dutch, 0E=Polish, 0F=Czech, 10=Swedish, 11=Portugese, 12=Romanian (Also Update MCU RAM)						
1.1.1.2.2 For BenQ model						
Write Language to EEPROM (For Europe)	AA	97	6~12	cksum	√	
1.1.1.2.3 For BenQ model						
Change Language type to Asia	D1	AA	XX	cksum	√	
For BenQ model						
Change Language Type to Europe	D1	XX*	XX	cksum	√	XX* = Non “AA” value
Write EEPROM OSD Timer	AA	98	Data	cksum	√	
Write EEPROM Volume	AA	99	Data	cksum	√	
Write EEPROM Gamma index	AA	9A	Data	cksum	√	For model with Gamma curve selection function 0: By-pass 1: Enable Others: Impermissible
Write EEPROM brightness default	AA	9C	Data	cksum	√	Set brightness default of PWM(may not match OSD) <Note H>
Write OSD Transparency to EEPROM	AA	9E	Data	cksum	√	
Write OSD Rotation to EEPROM	AA	9F	Data	cksum	√	
Write URL setting to EEPROM	AA	A0	Data	cksum	√	Range: 0~2 Others: Impermissible
Write OSD/OSM setting to EEPROM	AA	A1	Data	cksum	√	0: OSD 1: OSM Others: Impermissible
Write First Auto setting to EEPROM	AA	A2	Data	cksum	√	0: Disable first auto 1: Enable first auto Others: Impermissible
Write “Factory Page Language” setting to EEPROM	AA	A3	Data	cksum	√	0: English 5: Japanese Others: Impermissible
Read C1 (Bluish) R-Gain data from EEPROM	A3	3C	XX	cksum	√	
Read C1 (Bluish) G-Gain data from EEPROM	A3	3D	XX	cksum	√	
Read C1 (Bluish) B-Gain data from EEPROM	A3	3E	XX	cksum	√	
Read C2 (sRGB) R-Gain data from EEPROM	A3	4C	XX	cksum	√	
Read C2 (sRGB) G-Gain data from EEPROM	A3	4D	XX	cksum	√	
Read C2 (sRGB) B-Gain data from EEPROM	A3	4E	XX	cksum	√	
Read C3 (Reddish) R-Gain data from EEPROM	A3	5C	XX	cksum	√	
Read C3 (Reddish) G-Gain data from EEPROM	A3	5D	XX	cksum	√	
Read C3 (Reddish) B-Gain data from EEPROM	A3	5E	XX	cksum	√	
Read User R-Gain data from EEPROM	A3	6C	XX	cksum	√	
Read User G-Gain data from EEPROM	A3	6D	XX	cksum	√	
Read User B-Gain data from EEPROM	A3	6E	XX	cksum	√	
Read sRGB R-Gain data from EEPROM	A3	7C	XX	cksum	√	
Read sRGB G-Gain data from EEPROM	A3	7D	XX	cksum	√	
Read sRGB B-Gain data from EEPROM	A3	7E	XX	cksum	√	Reserved for some model have extra color temperature

Read Contrast from EEPROM	A3	92	XX	cksum	√	
Read Brightness from EEPROM	A3	93	XX	cksum	√	
Read C/T index from EEPROM	A3	94	XX	cksum	√	1=C1/9300/Bluish, 2=C2/6500/Normal/ 3=C3/5800/Reddish, 4=User, 5=SRGB
Read OSD-Hpos EEPROM	A3	95	XX	cksum	√	
Read OSD-Vpos from EEPROM	A3	96	XX	cksum	√	
1.1.1.1.3 For excluding BenQ model						0=DE, 1=EN, 2=ES, 3=FR, 4=IT, 5=JA, 6=繁中, 7=簡中
Read Language from EEPROM	A3	97	XX	cksum	√	(Also Update MCU RAM)
1.1.1.3.1 For BenQ model						0=DE, 1=EN, 2=ES, 3=FR, 4=IT, 5=JA, 6=繁中, 7=簡中
Read Language to EEPROM (For Asia)	A3	97	0~7	cksum	√	
1.1.1.3.2 For BenQ model						0=EN, 6=French, 7=Deutsch, 8=Italian, 9=Spanish, 0A=Hungarian, 0B=Serbian, 0C=Russian, 0D=Dutch, 0E=Polish, 0F=Czech, 10=Swedish, 11=Portugese, 12=Romanian
Read Language to EEPROM (For Europe)	A3	97	6~12	cksum	√	
Read OSD Timer from EEPROM	A3	98	XX	cksum		√
Read Volume from EEPROM	A3	99	XX	cksum		√
Read Gamma index from EEPROM	A3	9A	XX	cksum		√
Read EEPROM brightness default	A3	9C	XX	cksum	√	For model with Gamma curve selection function 0: By-pass 1: Enable Set brightness default of PWM(may not match OSD) <Note H>
Read OSD Transparency from EEPROM	A3	9E	XX	cksum		√
Read OSD Rotation from EEPROM	A3	9F	XX	cksum		√
Read URL setting from EEPROM	A3	A0	XX	cksum		√
Read OSD/OSM setting from EEPROM	A3	A1	XX	cksum		√
Read First Auto setting from EEPROM	A3	A2	XX	cksum		√
Read "Factory Page Language" setting from EEPROM	A3	A3	XX	cksum		√
Change Color Temp. to C1/9300K/Bluish	CC	01	XX	cksum	√	
Change Color Temp. to C2/6500K/sRGB	CC	02	XX	cksum	√	
Change Color Temp. to C3/5800K/Reddish	CC	03	XX	cksum	√	
Change Color Temp. to User	CC	04	XX	cksum	√	
Change Color Temp. to sRGB	CC	05	XX	cksum	√	
Change Input Source to D-Sub	CD	01	XX	cksum		√
Change Input Source to DVI	CD	02	XX	cksum		√
On burn in mode	CE	01	XX	cksum		√
Off burn in mode	CE	XX*	XX	cksum	√	
Monitor is forced power saving	CF	01	XX	cksum		√

Monitor wake up from power saving	CF	XX*	XX	cksum	✓	XX* = Non "1" value
Change Sense-Eye mode to Standard	C0	00	XX	cksum	✓	Change Sense-Eye mode immediately. And store the index to EEPROM.
Change Sense-Eye mode to Movie1	C0	01	XX	cksum	✓	
Change Sense-Eye mode to Movie2	C0	02	XX	cksum	✓	
Change Sense-Eye mode to Photo	C0	03	XX	cksum	✓	
Set luminance sensor mode to Off	C1	00	XX	cksum	✓	Change luminance sensor mode immediately. And store the index to EEPROM.
Set luminance sensor mode to Bright	C1	01	XX	cksum	✓	
Set luminance sensor mode to Moderate	C1	02	XX	cksum	✓	
Set luminance sensor mode to Dim	C1	03	XX	cksum	✓	
User mode to factory mode	1A	5A	XX	cksum	✓	
Auto Color (Offset1, Offset2, Gain)	1B	5A	XX	cksum	✓	
Copy EDID Serial number to EEPROM	1C	5A	XX	cksum	✓	For specified "Industry Customer" model.
Factory mode to User mode	1E	5A	XX	cksum	✓	
Clear user mode and factory recall	1F	5A	XX	cksum	✓	Store data to EEPROM
Write EDID data to MCU DDC RAM	55	NA	NA	NA	✓	For MTV312 MCU type
Copy DDC RAM data to EEPROM	BB	NA	NA	NA	✓	For MTV312 MCU type
Drive WP pin to low to enable write DDC IC	55	NA	NA	NA	✓	For stand alone DDC IC
Drive WP pin to high to disenable write function	BB	NA	NA	NA	✓	For stand alone DDC IC
Switch DDC bus to DVI-A DDC IC	44	NA	NA	NA	✓	For input signal with multi-input source
Switch DDC bus to DVI-D DDC IC	33	NA	NA	NA	✓	For input signal with multi-input source
Read ADC R-Offset1-Low byte	AE	13	Data	cksum	✓	For debug only
Read ADC G-Offset1-Low byte	AE	14	Data	cksum	✓	For debug only
Read ADC B-Offset1-Low byte	AE	15	Data	cksum	✓	For debug only
Read ADC R-Offset1-High byte	AE	16	Data	cksum	✓	For debug only
Read ADC G-Offset1-High byte	AE	17	Data	cksum	✓	For debug only
Read ADC B-Offset1-High byte	AE	18	Data	cksum	✓	For debug only
Read ADC R-Offset2-Low byte	AE	23	Data	cksum	✓	For debug only
Read ADC G-Offset2-Low byte	AE	24	Data	cksum	✓	For debug only
Read ADC B-Offset2-Low byte	AE	25	Data	cksum	✓	For debug only
Read ADC R-Offset2-High byte	AE	26	Data	cksum	✓	For debug only
Read ADC G-Offset2-High byte	AE	27	Data	cksum	✓	For debug only
Read ADC B-Offset2-High byte	AE	28	Data	cksum	✓	For debug only
Read ADC R-Gain-Low byte	AE	33	Data	cksum	✓	For debug only
Read ADC G-Gain-Low byte	AE	34	Data	cksum	✓	For debug only
Read ADC B-Gain-Low byte	AE	35	Data	cksum	✓	For debug only
Read ADC R-Gain-High byte	AE	36	Data	cksum	✓	For debug only
Read ADC G-Gain-High byte	AE	37	Data	cksum	✓	For debug only
Read ADC B-Gain-High byte	AE	38	Data	cksum	✓	For debug only
Write ADC R-Offset2-Low byte	AF	13	XX	cksum	✓	For debug only
Write ADC G-Offset2-Low byte	AF	14	XX	cksum	✓	For debug only
Write ADC B-Offset2-Low byte	AF	15	XX	cksum	✓	For debug only
Write ADC R-Offset2-High byte	AF	16	XX	cksum	✓	For debug only
Write ADC G-Offset2-High byte	AF	17	XX	cksum	✓	For debug only
Write ADC B-Offset2-High byte	AF	18	XX	cksum	✓	For debug only
Write ADC R-Offset2-Low byte	AF	23	XX	cksum	✓	For debug only
Write ADC G-Offset2-Low byte	AF	24	XX	cksum	✓	For debug only

Write ADC B-Offset2-Low byte	AF	25	XX	cksum	✓	For debug only
Write ADC R-Offset2-High byte	AF	26	XX	cksum	✓	For debug only
Write ADC G-Offset2-High byte	AF	27	XX	cksum	✓	For debug only
Write ADC B-Offset2-High byte	AF	28	XX	cksum	✓	For debug only
Write ADC R-Gain-Low byte	AF	33	XX	cksum	✓	For debug only
Write ADC G-Gain-Low byte	AF	34	XX	cksum	✓	For debug only
Write ADC B-Gain-Low byte	AF	35	XX	cksum	✓	For debug only
Write ADC R-Gain-High byte	AF	36	XX	cksum	✓	For debug only
Write ADC G-Gain-High byte	AF	37	XX	cksum	✓	For debug only
Write ADC B-Gain-High byte	AF	38	XX	cksum	✓	For debug only
IIC Slave address 6E → 7C command	8 bytes command—(6E, 51, 84, 03, FF, 00, 00, cksum)				✓	For DDC/CI capability model

EEPROM Bank R/W (For Debug using only, not for Production Line Write EEPROM directly)

Read EEPROM Bank 0	B0	Address	XX	cksum	✓	
Read EEPROM Bank 1	B1	Address	XX	cksum	✓	
Read EEPROM Bank 2	B2	Address	XX	cksum	✓	(For 24C08 type) HDCP key area
Read EEPROM Bank 3	B3	Address	XX	cksum	✓	(For 24C08 type) HDCP key area
Read EEPROM Bank 4	B4	Address	XX	cksum	✓	(For 24C16 type)
Read EEPROM Bank 5	B5	Address	XX	cksum	✓	(For 24C16 type)
Read EEPROM Bank 6	B6	Address	XX	cksum	✓	(For 24C16 type)
Read EEPROM Bank 7	B7	Address	XX	cksum	✓	(For 24C16 type) HDCP key area
Write EEPROM Bank 0	B8	Address	Data	cksum	✓	
Write EEPROM Bank 1	B9	Address	Data	cksum	✓	
Write EEPROM Bank 2	BA	Address	Data	cksum	✓	(For 24C08 type) HDCP key area
Write EEPROM Bank 3	BB	Address	Data	cksum	✓	(For 24C08 type) HDCP key area
Write EEPROM Bank 4	BC	Address	Data	cksum	✓	(For 24C16 type)
Write EEPROM Bank 5	BD	Address	Data	cksum	✓	(For 24C16 type)
Write EEPROM Bank 6	BE	Address	Data	cksum	✓	(For 24C16 type) HDCP key area
Write EEPROM Bank 7	BF	Address	Data	cksum	✓	(For 24C16 type) HDCP key area

<Note A> Byte4 (cksum) = Byte1 + Byte2 + Byte3

<Note B> Data = The value write to MCU or EEPROM

<Note C> XX = don't care, any value (<=0xFF).

<Note D>

When PC Host sends 0x7D command to MCU, MCU must return as following (2 bytes)

Return Code	R-Byte1	R-Byte2
Checksum error code	FC	AA
Normal return code	the above Byte3 (/data)	FC
If normal return code is exact FCh	FC	CF

<Note E>

DDC/CI command → IIC command

Command code for DDC/CI mode change to IIC alignment mode

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
0x6E	0x51	0x84	0x03	0xff	0x00	0x00	checksum

Description:

1. For DDC/CI supported model, its default IIC slave address is set to 0x6E, not 0x7C. So the above command words must be issued before doing IIC alignment procedure. It is to inform MCU that change IIC slave address from 0x6E to 0x7C.

2. Where Byte8 (checksum) = Byte1 xor Byte2 xor ... xor Byte7

USB Test Procedure (N/A)

A. Introduction

The CATC UHT USB Hub Tester is a modular unit designed for use on the production line to test USB Hubs for proper functionality according to the USB specifications.

The UHT tester performs the following tests:

1. hub enumeration
2. hub reset, suspend and resume operation
3. connection and enumeration of a low-speed device (on each downstream port)
4. data loop-back integrity test with a low-speed device (on each downstream port)
5. connection and enumeration of a full-speed device (on each downstream port)
6. data loop-back integrity test with a full-speed device (on each downstream port)
7. individual port suspend and resume operations (on each downstream port)
8. remote wakeup detection and propagation from each of the downstream ports
9. hub-initiated remote wakeup on connect/disconnect events
10. hub over current detection and reporting to the host
11. over current protection (gang or per-port configuration)
12. downstream current restoration (over current removed)

B. System Setup

Position the CATC UHT box on the test bench, near the USB hub to be evaluated. Connect the DC plug of the AC to 5V DC@1000mA power converter to the +5V power receptacle of the CATC UHT box. To activate the unit, plug the AC to DC converter into an appropriate AC power outlet.

In the USB test system, connect the CATC UHT box as follows:

1. Connect a USB cable between the upstream port of the USB hub under test and the USB port of the host PC.
2. Connect a USB cable between the first downstream port to be tested and the USB connector labeled "CH1".
3. Repeat step B for the next ports to be tested, connecting to "CH2", "CH3", "CH4" in sequence.

C. Software Installation

Make a copy of the CATC diskette for backup, then copy its contents to the hard drive of the USB-capable PC to be used as the test system host. The UHT software program (usb_uht.exe) is a DOS application and must be run under the DOS operating system that supports both HIC and OHCI USB host controller implementations.

To run the program, at the DOS prompt, type USB_UHT and press "Enter" key. The program will clear the monitor screen and begin execution. During the test, the program displays the test results on the monitor screen.

To terminate the program and get back to the DOS prompt, press any key.

Audio Test Procedure (N/A)

A. Audio spec.

Amplifier	Spec.	Note
Input Sensitivity @ 1KHz (mV)	500Vrms	
Output Power	2W/Ch	
THD @1KHz 1W (%)	<1%	
S/N Ratio (dB)	> 40dB	
Cross Talk	< -50dB	
R/L Channel Check	OK	
Pop Sound Check	OK	
Speaker		
Nominal Speaker Impedance @1KHz 1V	8-Ohm±15%	
Resonant Frequency	300Hz±20%	
Rated/Max Power	2W/3W	
Output SPL @2W 50cm	84±3dB	
Distortion	< 5%	

Audio Test Procedures

1.) PC Playback

- Plug in the Audio input to a PC I/O ports.
- Playback a specified CD, listening to the playback music.

Reject criteria:

- Playback sound is not clear or distorted.
- Loss of high or low frequencies.
- Abnormal or no sound is heard.

2.) Left and right speaker functions and polarity check

- Playback music by switching off the right channel, listen to the music.
- Playback music by switching off the left channel, listen to the music.

Reject criteria:

- Both left and right channels sounded.
- The left and right channels playback are reversed.
- Abnormal or no sound is heard during right or left channels playback.

3.) Volume control check

- Playback and listen to the music.
- Turn the volume control from normal position to maximum then to minimum then back to normal position again.

Reject criteria:

- 甲、The sound output level is not decrease or increase smoothly.

- (b) Abnormal sound is heard during the volume control is turning.
- (c) Sound is heard when the volume control turn to minimum.
- (d) No increase or decrease of sound level when turning the volume control.

4.) Power saving

- (a) Playback and listen to the music.
- (b) Into power saving mode, the Left and Right speakers is muted.

Reject criteria:

- (a) The Left & Right speakers output are not muted.
- (b) One of the Left or Right speaker is not muted.

Inverter alignment procedure (N/A)

The list of necessary alignment for an Inverter:

Items	Description	Remark
1	Frequency adjustment	
2		

A. Preparation:

- Equipment : FLUCK 187 true RMS multimeter & Ceramic blade .
- Setup FLUCK : Turn Rotary switch to Vac & push key **Hz % ms** select frequency test function (Fig 1)

1.1.2 B. Frequency adjustment:

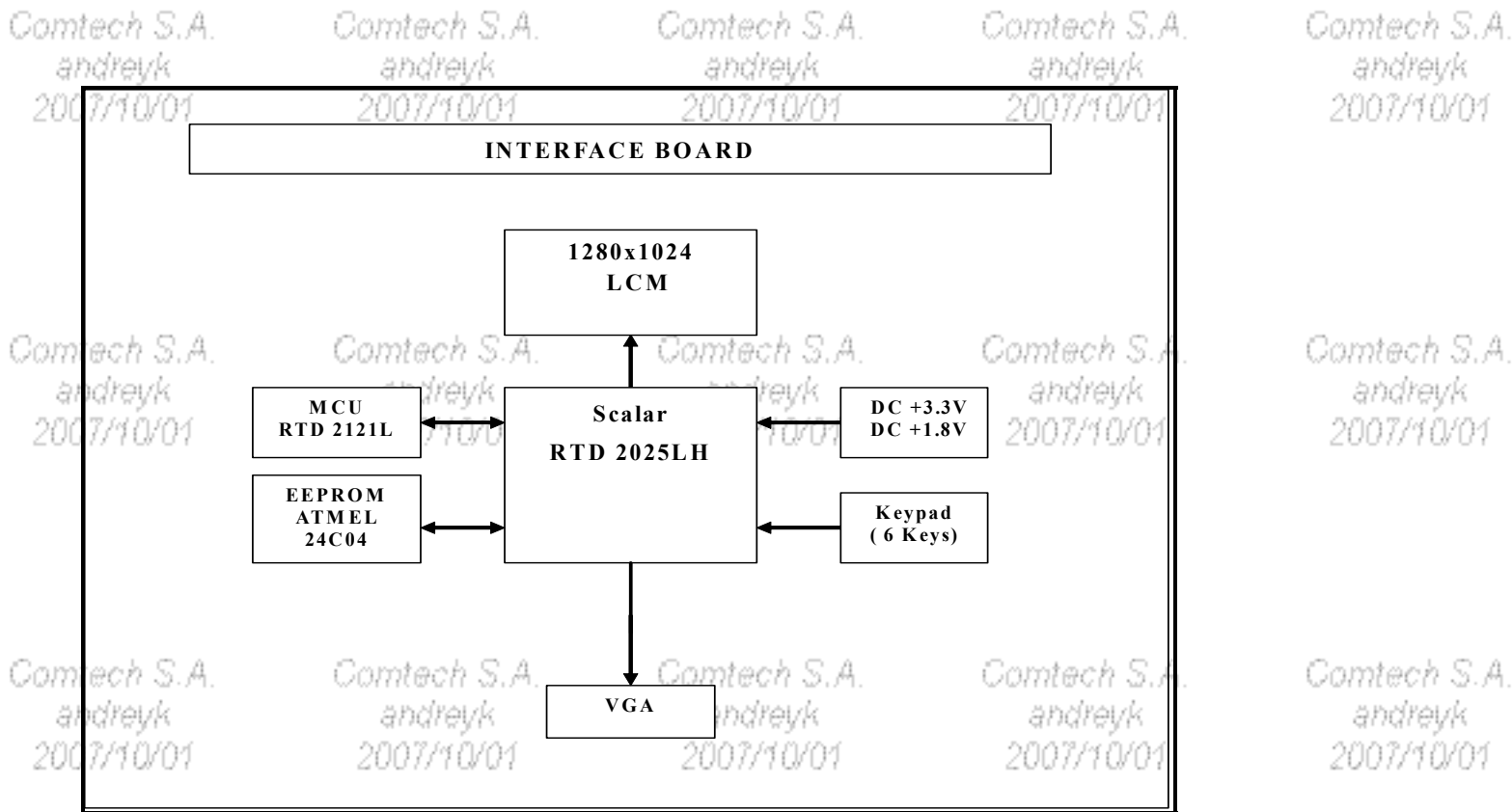
PS: frequency adjustment need in continuous mode.
Add 3.3V on CN807 PIN8 inverter will work in continuous mode.

- Connected all connector on Inverter
- Turn on the inverter
- Put black probe to touch ground & red probe to touch the IC801 pin20
- Monitor frequency between 42kHz ~ 42.5KHz by FLUCK 187
- If frequency is under the 42Khz, turn right of VR801 to increase the frequency by ceramic blade
- If frequency is over the 42.5Khz, turn left of VR801 to decrease the frequency by ceramic blade

6. Level 2 Circuit Board and Standard Parts Replacement

6.1 Block diagram

The E900Wa consists of a LCD module with 4 lamps, a power board, a control board, and an interface board. The block diagram is shown as below.



6.2. Trouble Shooting Guide

No Display or display is unstable:

1.1 Interface Board:

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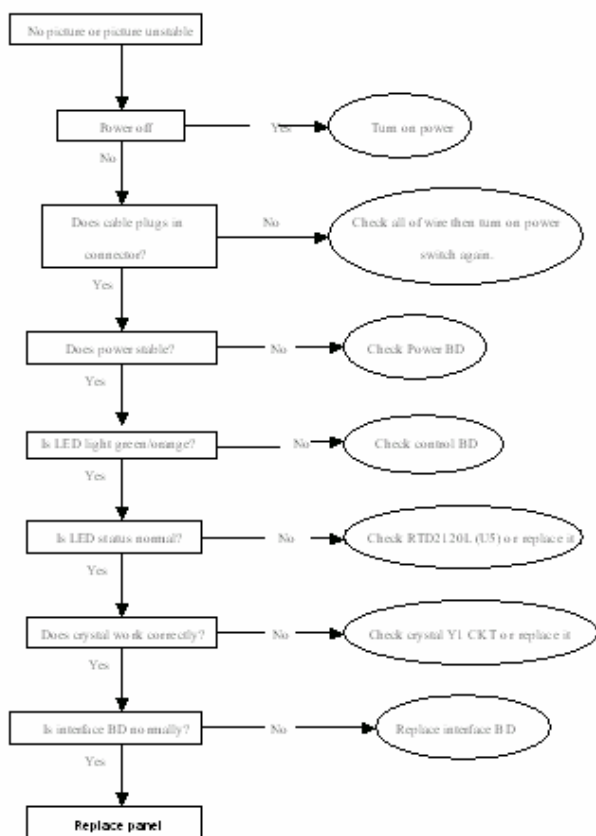
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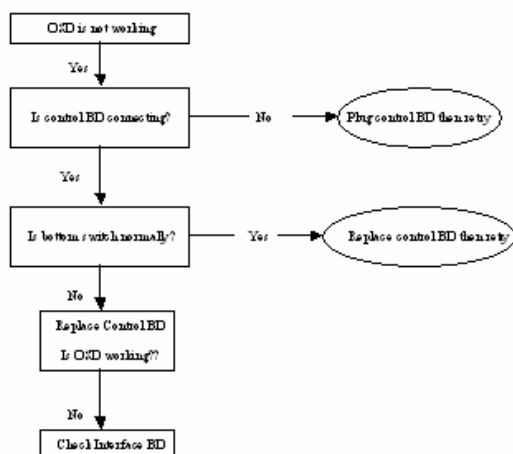
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2. BUTTON function: 2.1 Control Board

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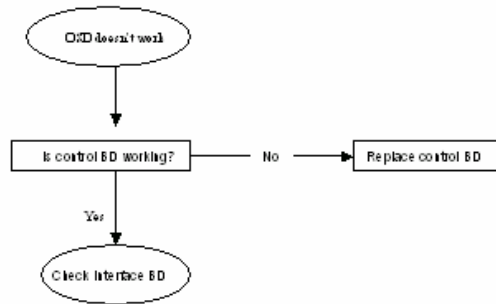
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3. OSD function:



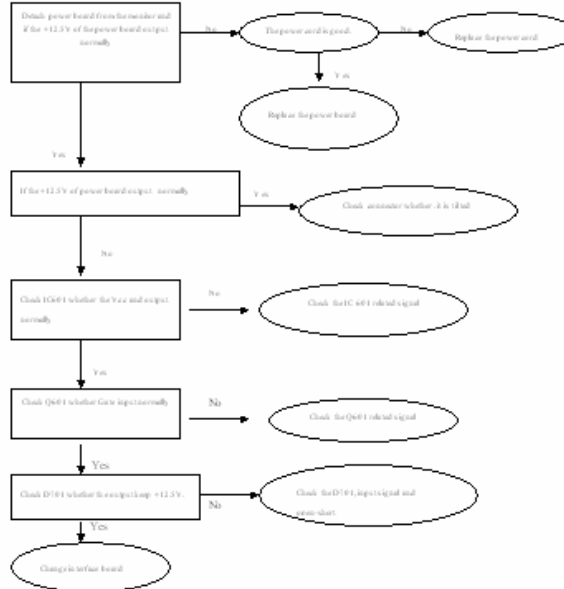
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4 Power no work troubleshooting

4.1 Power no output troubleshooting



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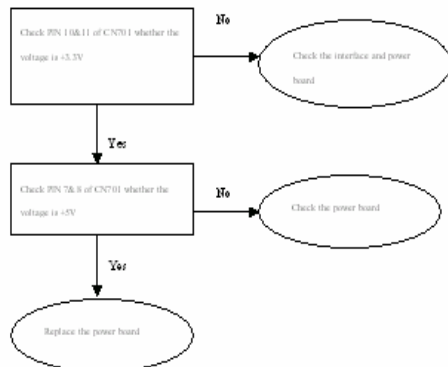
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4.2 Power no PFC troubleshooting

5 Inverter no work troubleshooting



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6.3 Circuit Operation Theory

(a) Circuit operation theory:

A basic operation theory for this interface board is to convert analog signals of Red, Green and Blue to digital signals of Red, Green and Blue. The scaling IC has internal A/D converter, internal OSD, built in LVDS transmitter and auto-detect input timing functions. A/D converter is convert analog signal to digital data. OSD is offering adjustable functions to end-user. Detect timing is for detect change mode. LVDS transmitter is used to compress the digital RGB data, the Hsync, Vsync and pixel clock generated by Scaling then output to LCD module. MCU stores source code and offers H/W DDC2Bi function & controls system processing. EEPROM is stored DDC data, OSD common data and user mode data.

(b) IC introduction:

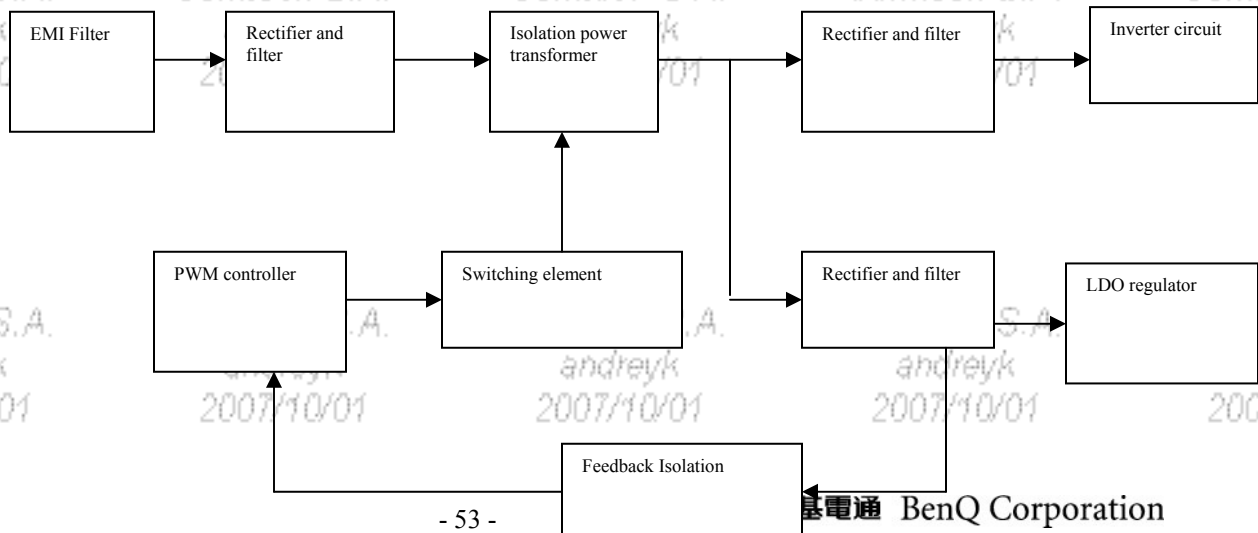
- 1.) DDC (Display Data Channel) function: We use DDC IC to support DDC2Bi function. DDC data is store in 24C02 (EEPROM). Those data related to LCD monitor specification. PC can read them by “SDA” and “SCL” serial communication for I²C communication for DDC2Bi.
- 2.) Scalar IC: There are A/D, TMDS receiver, Scaling, OSD and LVDS transmitter functions built-in the RTD2025L IC. Scaling IC is revolutionary scaling and color engine, capable of expanding any source resolution to a highly uniform and sharp image or down scaling from 1280X1024, combined with the critically proven integrated 8 bit triple-ADC and patented Rapid-lock digital clock recovery system. It also support detect mode and DPMS control.
- 3.) RTD2120L: Control unit, it controls all the functions of this interface board, just like the OSD display setting, the adjustable items, adjusted data storage, the external IIC communication, support DDC2Bi.
- 4.) EEPROM: We use 24C04 to store all the adjustable data, user settings and use 24C02 to store D-SUB EDID data.

A-2.) Control board introduction:

There are 6 keys for user's control which includes “Power”, “Menu”, “Right/Plus”, “Left/Minus”, “Auto”, and “Input Source”. The following descriptions are the introduction of these keys.

- (1) Power key: to turn/off power of monitor
- (2) “Menu” key: to enter sub-menus or select items.
- (3) “Up/Plus key: to select previous and to increase adjustment and Contrast Popup submenu hotkey
- (4) “Down/Minus” key: to select next and to decrease adjustment and Brightness Popup submenu hotkey
- (5) “Auto” key: to perform auto adjustment
- (6) LED: It indicates the DPMS status of this LCD monitor; green light means DPMS on (Normal operating condition). Amber light means DPMS off (Power Saving).

A-3.) Power board diagram:



#1 EMI Filter

This circuit (fig. 2) is designed to inhibit electrical and magnetic interference for meeting FCC, VDE, VCCI standard requirements.

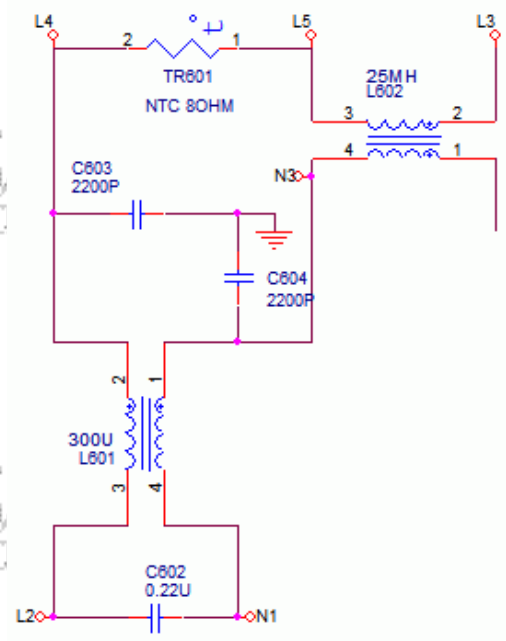


Fig. 2

#2 Rectifier and filter

AC Voltage (90-264V) is rectified and filtered by BD601, C605 (See Fig 3) and the DC Output voltage is $1.4 \times (\text{AC input})$. (See Fig.3)

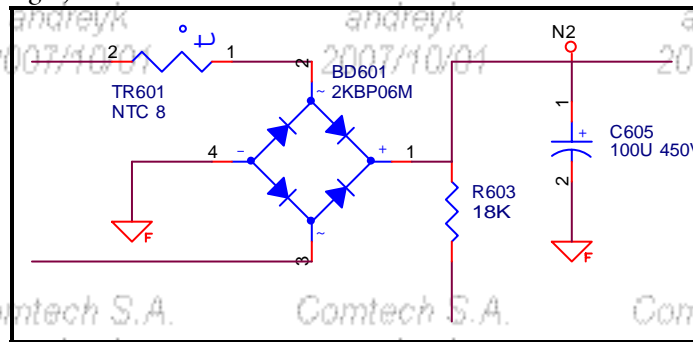


Fig. 3

#3 Switching element and Isolation power transformer

When the Q601 turns on, energy is stored in the transformer. During Q601 turn-off period, the stored energy is delivered to the secondary of transformer. R607, C607 and D601 are a snubber circuit. R615 is current sense resistor to control output power. (See Fig.4)

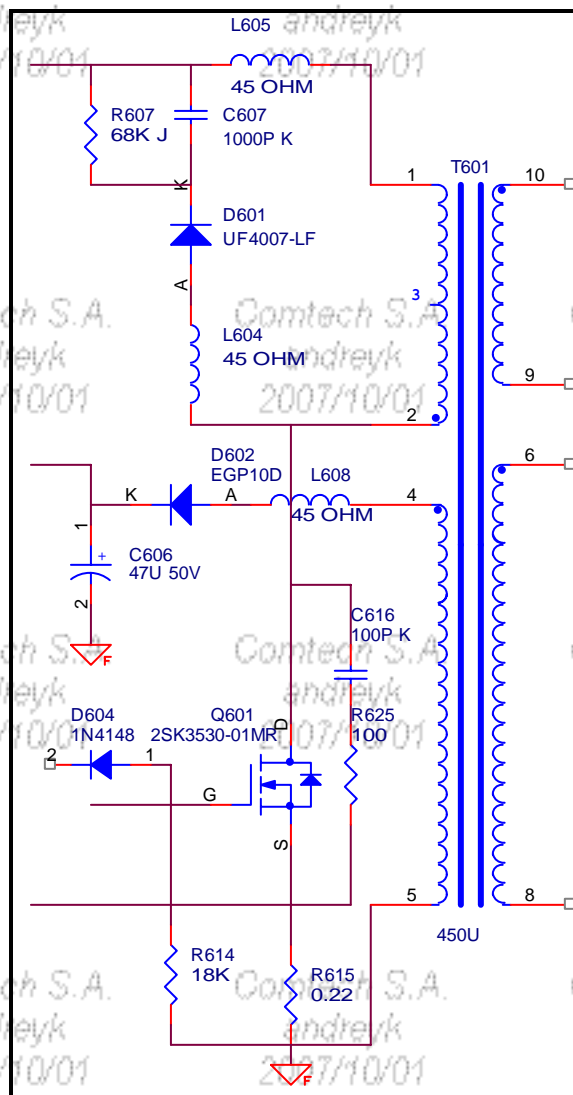


Fig. 4

#4 Rectifier and filter

D701,D702,C703,C704,C707,C708 and C709 are to produce DC output. (See Fig.5)

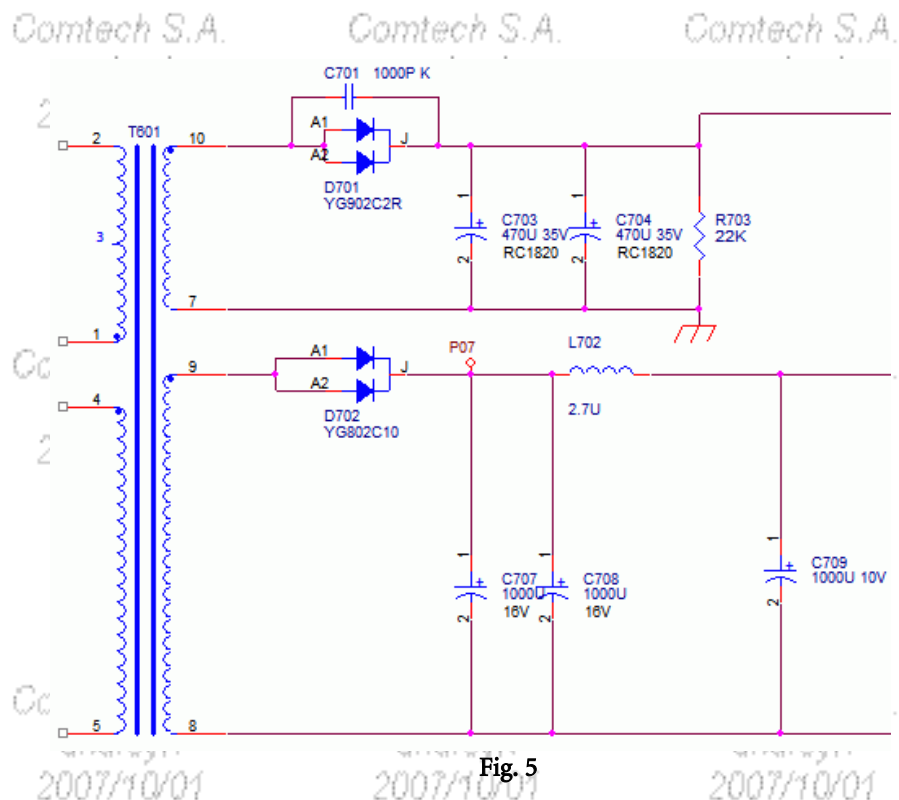


Fig. 5

#5 PWM Controller

The PWM controller NCP1200A implements a standard current mode architecture. With an internal structure operating at a fixed 40KHz. Where the switch time is dictated by the peak current set-point. When the current set-point falls below a given value. The output power demand diminishes, the IC automatically enters the so-called skip cycle mode and provides excellent efficiency.

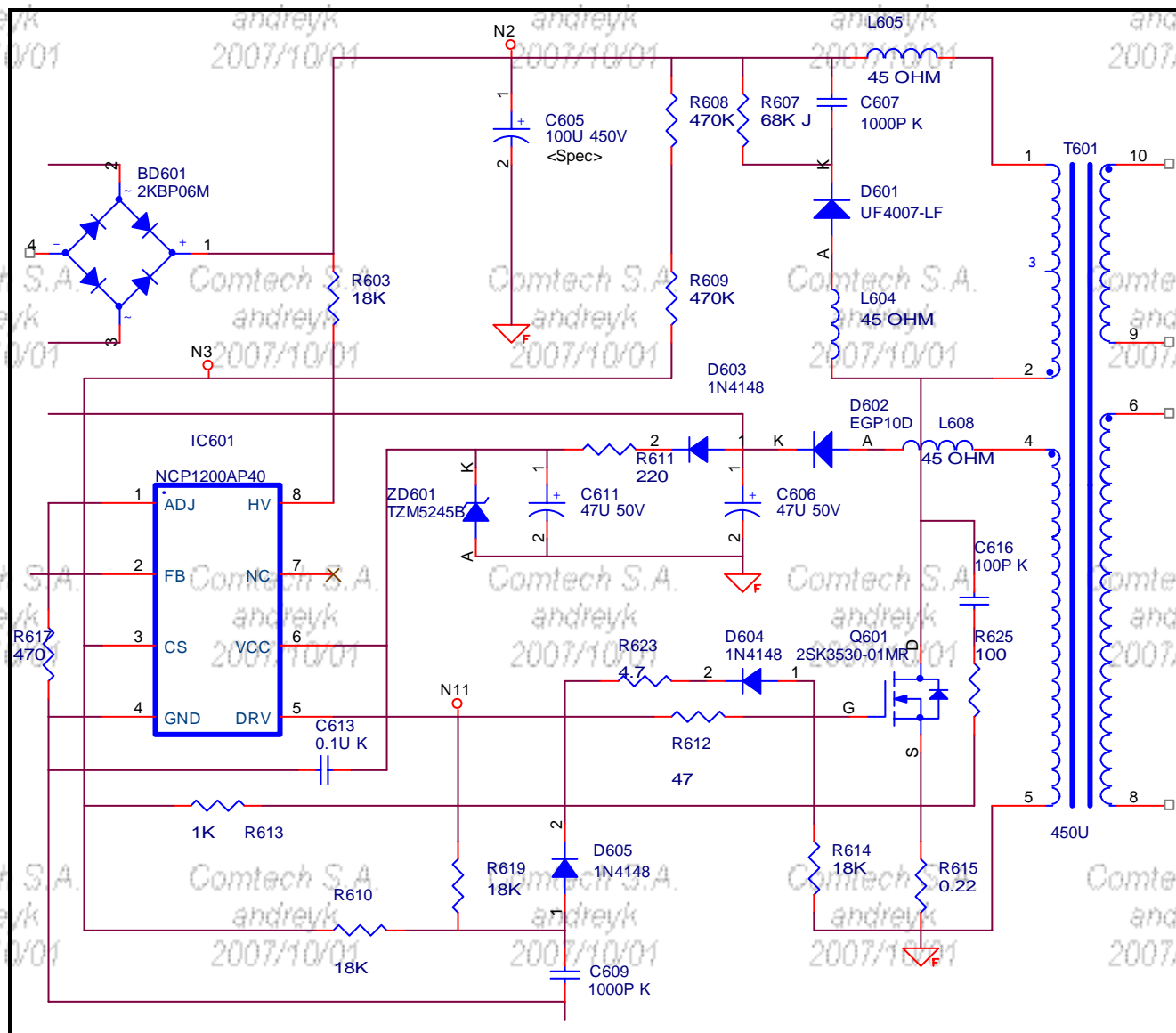


Fig. 6

#6 Feedback circuit

PC123 is a photo-coupler and TL431 is a shunt regulation. They are used to detect the output voltage change and be the primary and secondary isolation. When output voltage changes, the feedback voltage will be compared and duty cycle will be decided to control the correct output voltage. (See Fig.7)

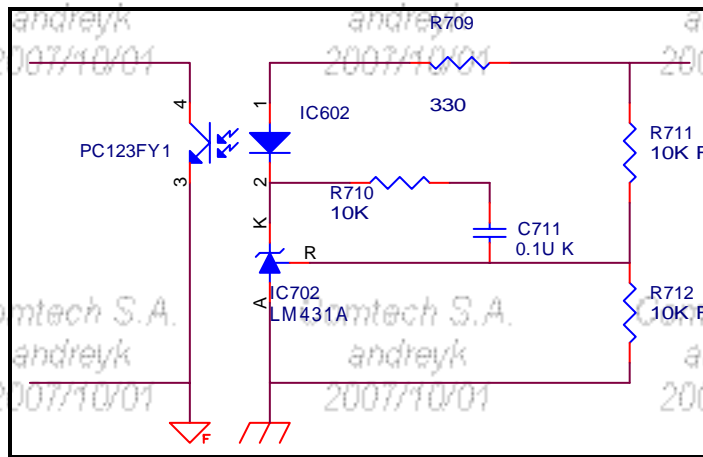


Fig. 7

A-3.) Control board introduction:

The main parts of the control board are a push button, and a LED.

(a) **Push button:** It's a simple switch function, pressing it for "ON" to do the auto adjustment function, releasing it for "OFF" to do nothing.

(c) **LED:** It indicates the DPMS status of this LCD monitor; green light means DPMS on (Normal operating condition). Amber light means DPMS off (Power off condition).

A-4.) Inverter Circuit Operation Theory

An Intelligent CCFL Inverter Controller --- OZ9938

The OZ9938 is a high-performance, cost-effective CCFL (Cold Cathode Fluorescent Lamp) controller designed for driving large-size Liquid Crystal Display (LCD) applications requiring 2 to 6 CCFLs.

The OZ9938 provides two drive signals for most power conversion topologies while maintaining high-efficiency operation. The PWM controller provides a soft-start operation, current and voltage regulation, over-voltage and over-current protection, high drive capability and multiple dimming functions (internal PWM or external PWM or analog dimming functions).

The controller converts unregulated DC voltages into a nearly sinusoidal lamp voltage and current waveforms.

The control logic provides a regulated ignition voltage and appropriate protection features for over-voltage or over-current conditions. The OZ9938 offers a high level of integration, while maintaining flexibility and high-efficiency operation that reduces external component heating, resulting in higher reliability and longer CCFL life. The proprietary design technique provides a simple, low-cost system solution.

Pin Assignment of OZ9938

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Pin No.	Names	Description
1	DRV1	Drive output
2	VDDA	Supply voltage input
3	TIMER	Timing capacitor to set striking time and shutdown delay time
4	DIM	Analog dimming or Internal LPWM dimming or external PWM pulse input for dimming function
5	ISEN	Current sense feedback
6	VSEN	Voltage sense feedback
7	OVPT	Over-voltage/ over-current protection threshold setting pin
8	NC	No connection
9	NC	No connection
10	ENA	ON/OFF control of IC
11	LCT	Timing capacitor to set internal PWM dimming frequency and also a pin for analog dimming selection
12	SSTCMP	Capacitor for soft start time and loop compensation
13	CT	Timing resistor and capacitor for operation and striking frequency
14	GNDA	Ground for analog signals
15	DRV2	Drive output
16	PGND	Ground for power paths

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Push-Pull Configuration

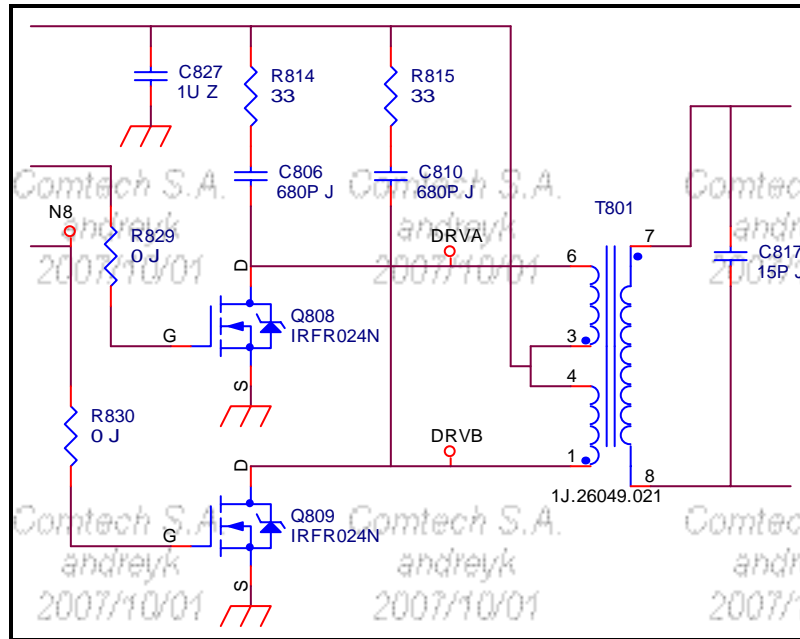


Fig. 1

Fig. 1 the Q808, Q809 and T801 form a full-bridge configuration.

When Q808 turn on, then Q809 turn off

Q808 turn off, then Q809 turn on.

The result in T801 primary coil has an AC square waveform.

Certainly, the secondary of T801 will produce high voltage AC square waveform.

Through C817 filter capacitor, will output sin waveform. T802, C824 are also the same.

Feed-back Circuit

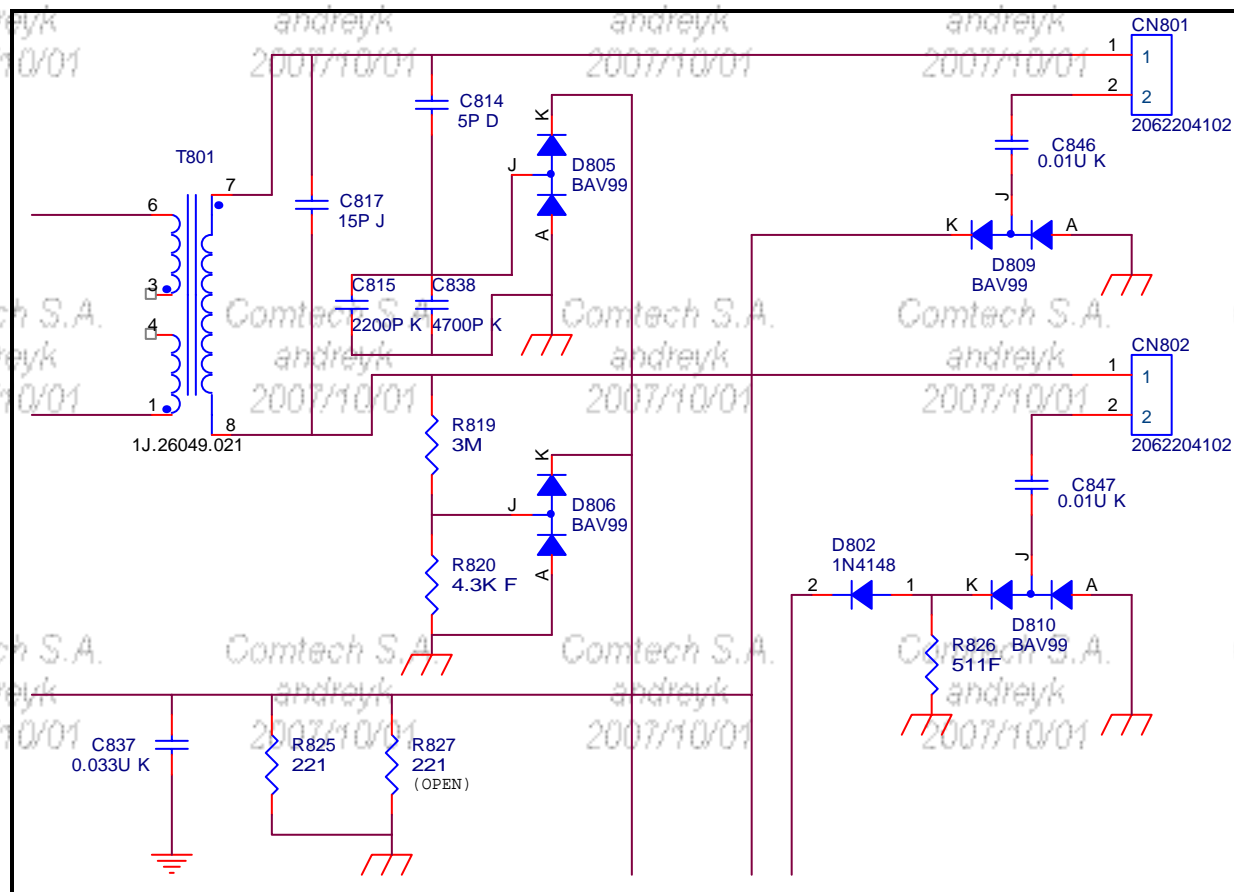


Fig. 2

Fig. 2 shows the feedback circuit consists of a lamp, C846, D809, R825, R827 and C837. With the lamp current through D809, a half sin-waveform voltage signal is produced. We may get the Maximum value through R825/R827/C837. After OZ9938 gets the feedback voltage signal from PIN5, the duty of the PWM driver outputs is decided.

6.4 Spare Parts List

Ship To Area	9J Part Number	Description
Europe	9J.0BG72.A8x	19W LCD MNT (E900WA-A8x)
BQA, BQP, BQC	9J.0BG72.A4x	19W LCD MNT (E900WA-A4x)

Category	Part Number	Description
LCDM	5F.91L2S.001	LCDM M190PW01-V0 AUO
PCBA	5E.0BG01.003	PCBA I/F BD E900W A+SPK MI
PCBA	5E.0BG02.003	PCBA SPS BD E900W A+SPK MI
PCBA	5E.0BG03.001	PCBA CTRL BD E900W MI
PCBA	5E.0BG26.001	PCBA LED BD E900W MI
Mechanical	6K.0BG02.001	ASSY BZL ABS 7054C E900W
Mechanical	6K.0BG11.001	ASSY RC ABS 7054C E900W
Mechanical	6K.0BG04.001	ASSY COLUMN ABS E900W
Mechanical	6K.0BG05.001	ASSY BASE W/P E900W
Dummy Packing	4D.0BG01.001	CTN C 515*134*465 E900W
Dummy Packing	4G.0BG01.001	Cushion L EPS E900W
Dummy Packing	4G.0BG02.001	Cushion R EPS E900W
Dummy Packing	5K.L2H06.501	Cable Signal/C H+V OD_5.5 1.8M
Dummy Packing	4J.0BG02.001	QSG Sensation E-SERIES
Dummy Packing	5B.0BG01.001	CD Sensation E-SERIES

Appendix 1 – Screw List / Torque

(A) STANDARD SCREW TORQUE SPEC.

ITEM	P/N	DESCRIPTION	MOUNTING MATERIAL	TORQUE (KG-CM)	HOLE SIZE (MM)	Screw Head
1	8F.205B4.019	SCRW MACH HEX #4-40*0.3" NI	METAL	5.0±0.6	#4-40	X
2	8F.5A224.5R0	SCRW MACH FLAT M3*5L ZN	METAL	Side mount: 3±0.6 Other: 4±0.6	M3*0.5	#2
3	8F.XA356.6R0	SCRW TAP FLAT M4*6L B-ZN NYL	METAL	9.0±1.0	M4*0.7	#2
4	8F.8A356.100	SCREW MACH FPH M4*10L B-ZN NYL	METAL	11.0±1.0	M4*0.7	#2
5	8F.5A356.8R0	SCRW MACH FH M4*8L B-ZN NYL	METAL	9.0±1.0	M4*0.7	#2
6	6K.L7204.001	ASSY SCREW M4*10L FP527	METAL	11.0±1.0	M4*0.7	#2
7	6K.L8810.001	ASSY SCREW M4*8L FP726A NLK ISU	METAL	9.0±1.0	M4*0.7	#2
8	6K.L8811.001	ASSY SCREW M4*6 FP726A NLK ISU (8F.5A456.6R0+4B.L7212.001)	METAL	9.0±1.0	M4*0.7	#2
9	8F.5A422.2R4	SCRW MACH FLAT-P M2*2.4L ZN	Plastic	1.0±0.1	Ø1.4±0.05	#1
10	8F.VA512.4R0	SCRW TAP PH M2*4L NI	Plastic	1.0±0.2	Ø1.6±0.05	#1
11	8F.XA213.8R0	SCRW TAP FLAT/PT M2.5*8L ZN	Plastic	4.0±0.5	Ø2.0±0.05	#1
12	8F.WA314.8R0	SCRW TAP CAP M3*1.34P*8L B-ZN	PLASTIC	5.0±1.0	Ø2.35±0.05	#2
13	8F.XA524.6R0	SCRW TAP FLT M3*6L NI	PLASTIC	4.5±0.5	Ø2.35±0.05	#2
14	8F.XA314.8R0	SCRW TAP FLAT M3*1.34P*8L B-ZN	PLASTIC	4.5±0.5	Ø2.35±0.05	#2
15	8F.XA326.100	SCRW TAP FLAT M4*10L B-ZN	Plastic	7.5±0.5	Ø3.4±0.05	#2
16	8F.MA224.5R5	SCRW TAP FLAT-P M3*5.5L ZN	Metal	None tread : 8~10 Have tread: 6~8 Aluminum: 4~5	Ø2.68±0.03	#2
17	8F.MA324.5R5	SCRW TAP FLAT-P M3*5.5L B-ZN	Metal	None tread : 8~10 Have tread: 6~8 Aluminum: 4~5	Ø2.68±0.03	#2
18	8F.00273.6R0	SCRW TAP PH F/10WSH M3*6L C-ZN	Metal	None tread : 8~10 Have tread: 6~8 Aluminum: 4~5	Ø2.68±0.03	#2
19	8F.VZ526.6R0	SCRW TAP FLAT+EXTM4*6L ZN-W	Metal	10±1.0	M4*0.7	#2
20	8F.00007.144	SCREW TAP CAP #4-40*10 ZN	Aluminum	3.3±0.3	Ø2.6±0.03	#2

(B) SPECIAL SCREW TORQUE SPEC.

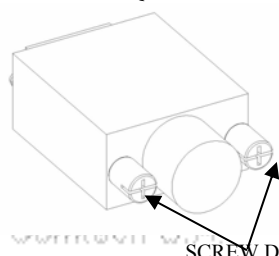
ITEM	P/N	DESCRIPTION	MOUNTING MATERIAL	TORQUE (KG-CM)	HOLE SIZE (MM)	Screw Head
1	8F.00274.8R0	SCREW FPH TAP M3*8L NI	Plastic	5.0±1.0	Ø2.35±0.05	#2
2	8F.00003.143	SCRW TAP PAN #4-40*3/8	Aluminum	3.3±0.3	Ø2.6±0.03	#2
3	8F.VG434.4R0	SCRW TAP PAN F/WSH M3*4L C-ZN	METAL	No thread : 8~10 Have thread:6~8 Aluminum:4~5	Ø2.68±0.03	#2
4	8F.1A356.100	SCRW MACH PAN M4*10L B-ZN NYLO	Metal	11.0±1.0	M4*0.7	#2
5	6K.L1G06.001	ASSY SCRW M4*12L L1740	METAL	11.0±1.0	M4*0.7	#2
6	8F.5A356.120	SCRW MACH FHM4*12L B-ZN NYL	METAL	11.0±1.0	M4*0.7	#2
7	8F.PA526.8R0	SCREW TAP PAN M4*8L NI	PLASTIC	7.5±0.5	Ø3.4±0.05	#2
8	8F.5A554.5R0	SCRW MACH FLAT M3*0.5P*5L NI N	METAL	Side mount:3±0.6 Other: 4±0.6	M3*0.5	#2
9	8F.EA524.6R0	SCRW TAP FH M3*6L NI	METAL	6.0±1.0	M3*0.5	#2

*SCREW Q'TYPE AND POSITION
REFERRED TO C328.

*NOTES:

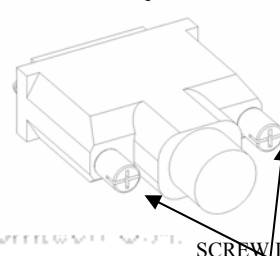
1. (A)STANDARD SCREW TORQUE SPEC.
2. (B)SPECIAL SCREW TORQUE SPEC.
3. T: TAPPING SCREW.
4. M: MACHING SCREW.

D-SUB Connector
SCREW TORQUE SPEC.



SCREW TORQUE: 1.2±0.3
(KG-CM)

DVI Connector
SCREW TORQUE SPEC.



SCREW TORQUE : 1.2±0.3(KG-
CM)

Fig. 1 Physical Dimension Front View and Side view

