## Table of Contents

# 1. Introduction

This specification describes Q9T4, which is a 19.0" analog/digital interface color TFT LCD monitor without audio. The monitor supports up to 1280x1024 pixel resolution and refresh rate of 75 Hz. The independent 6 bits R, G, B colors are capable of displaying 262K colors (scaler dithering output 16.2M colors). In addition, dithering function is supported. The features summary is shown below,

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

| Feature items | Specifications | Remark |
|---|---|---|
| Panel supplier & module name | **AUO M190EN04 V.2** | |
| Screen diagonal | 19.0" (480mm) | 376.32(H) x 301.056(V) |
| Display Format | SXGA / 1280 (H) x 1024 (V) | |
| Pixel Pitch | 0.294 mm x 0.294 mm | per one triad |
| Viewing Angle (@ Contrast Ratio = 10) | R/L: **70/70** degrees (typ.)<br>and U/D: **70/65** degrees (typ.) | Panel spec. |
| Analog interface with Scaling supported | **Yes** | With 15-pin D-sub connector |
| DVI interface with Scaling supported | **Yes** | With 24-pin DVI-D connector |
| Video interface with Scaling supported | No | |
| Max resolution mode supported | 1280 x 1024 @ 75Hz | |
| Number of Display Colors supported | 262K colors | scaler dithering output 16.2M colors |
| Contrast Ratio | **450:1 (typ.)** | |
| Luminance | **250 cd/m$^2$ (typ.)** | At CCFL 7mA & R/G/B saturated condition |
| AC power input | **Yes** | 90-264 Volts, 47-63 Hz. |
| DC power input (with AC power adapter) | No | |
| DPMS supported | **Yes** | ≤1W in power off preferred mode, 120V<br>≤2W, 240V |
| LED indicator for power status showed | **Yes** | Green/Amber/Non |
| OSD for control & information supported | **Yes** | |
| Multi-language supported for OSD | **Yes** | 8 languages |
| 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** | "iKey" function |
| DDC function supported (EDID ver. 1.3) | **Yes** | DDC2B only |
| Audio speakers supported | **No** | |
| Audio Jack (input connector) supported | **No** | |
| 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 | No | |
| Kensington compatible lock design | **Yes** | |

# 2. Operational Specification

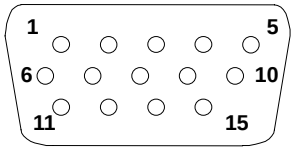
## 2.1 Power supply

| Item | Condition | Spec | OK | N.A | Remark |
|---|---|---|---|---|---|
| Input Voltage range | Universal input full range | 90~264VAC /47~63Hz | √ | | |
| Input Current range | 90 ~ 264VAC | ≤ 2.0 Arms | √ | | |
| Power Consumption | Normal "On" operation | < 40 W (w/o speaker) | √ | | LED: Green |
| DPMS | DPMS "Off" state | ≤ 1 W in power preferred mode, 120V<br>≤ 2 W, 240V | √ | | LED: Amber |
| Inrush Current | 110 VAC<br>220 VAC | < 30 A (peak)<br>< 60 A (peak) | √ | | Cold-start |
| Earth Leakage Current | 264 VAC/50Hz | < 3.5 mA | √ | | |
| Hi-Pot | 1. 1500VAC, 1 sec<br>2. Ground test: 30A, 1sec | Without damage<br>< 0.1 ohm | √ | | (on-line test)<br>(in-lab test) |
| Power Line Transient | IEC1000-4-4 | 1KV | √ | | |
| | IEC1000-4-5 (Surge) | Common: 2KV,<br>Differential: 1KV | √ | | |
| CCFL operation range | 90 ~ 264VAC | 3.0 mA ~7.5mA | √ | | Depends on panel source |
| CCFL Frequency | 90 ~ 264VAC | 40KHz ~ 80KHz | √ | | Depends on panel source |
| Power cord | | Color: Black<br>Length: 1500 +/- 50 mm | √ | | |

## 2.2 Signal interface

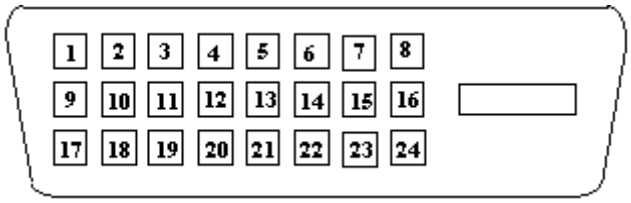
| Item | Condition | Spec | OK | N.A | Remark |
|---|---|---|---|---|---|
| Signal Cable | 15-pin D-Sub | Color: Black<br>Length: 1500 +/- 30 mm | √ | | |
| | 24-pin DVI-D | Color: Black<br>Length: 2000 +/- 50 mm | √ | | |
| Pin assignment | 15-pin D-sub connector | See Note-1 | √ | | For 15-pin D-sub |
| | 24-pin DVI-D connector | See Note-2 | √ | | For 24-pin DVI-D |
| Video input | Signal type | Separate analog R/G/B | √ | | For 15-pin D-sub |
| | Level | 700 mV (peak to peak) | √ | | |
| | Impedance | 75 Ohms +/- 1.5 Ohms | √ | | |
| Sync input | Signal type | Separate H/V-sync<br>Composite H/V-sync<br>(Positive/Negative) | √ | | For 15-pin D-sub |
| | Level | Logic High: 2.4V ~ 5.5V<br>Logic Low: 0V ~ 0.5V<br>(TTL level) | √ | | Refer to VESA VSIS Standard V1R1 |
| | Impedance | Minimum 2.2KΩ(pull down) | √ | | 10KΩ for application |
| | Sync Pulse Width (SPW) | 0.7 μs < H-SPW<br>1H < V-SPW | √ | | |

**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- |

## 2.3 Video performance

| Item | Condition | Spec | OK | N.A | Remark |
|---|---|---|---|---|---|
| Max. support Pixel rate | | 135 MHz | √ | | |
| Max. Resolution | | 1280 x 1024 | √ | | |
| Rise time + Fall time | | < 6.25 ns (50% of minimum pixel clock period) | √ | | 1280 x 1024 @ 75Hz (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 |

## 2.4 Scan range

| Item | Condition | Spec | OK | N.A | Remark |
|---|---|---|---|---|---|
| Horizontal | | 31 ~ 81 KHz | √ | | |
| Vertical | | 56 ~ 76 Hz | √ | | Without Frame buffer |

## 2.5 Plug & Play DDC2B Support

| Item | Condition | Spec | OK | N.A | Remark |
|---|---|---|---|---|---|
| DDC channel type | | DDC2B | √ | | |
| EDID | | Version 1.3 | √ | | Refer to Q9T4 S/W spec. document to see the detailed EDID data definition. |

## 2.6 Support Timings

| Input Timing | | | | Actual Output | | | |
|---|---|---|---|---|---|---|---|
| Resolution | Horizontal | Vertical | Dot Clock | Actual display | 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 |

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

# 3. Operational & Functional Specification

## 3.1 Video performance

| Item | Condition | Spec | OK | N.A | Remark |
|---|---|---|---|---|---|
| Resolution | Any input resolution modes which are under 1280 x 1024 | 1280 x 1024 | √ | | |
| Contrast ratio | | 450:1 (typ.) | √ | | |
| Brightness | At R/G/B saturated condition | 250 cd/m$^2$ (typ.) @ 7mA | √ | | |
| Response time | Rising + Falling time | 12 ms (typ.) | √ | | |
| Viewing angle | At Contrast ratio = 10 | R/L: 70/70 degrees (typ.) | √ | | |
| | At Contrast ratio = 10 | U/D: 70/65 degrees (typ.) | √ | | |
| CIE coordinate of White | | (0.31, 0.33) +/- (0.03, 0.03) | √ | | |
| Display colors | | 262K colors | √ | | scaler dithering output 16.2M colors |

## 3.2 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) ≧ 100 cd/㎡ | √ | | |

## 3.3 Acoustical Noise

| Item | Condition | Spec | OK | N.A | Remark |
|---|---|---|---|---|---|
| Acoustical Noise | At 1 meter distance & "Audio" function disabled | ≦ 40 dB/A | √ | | |

## 3.4 Environment

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

## 3.5 Transportation

| Item | Condition | Spec | OK | N.A | Remark |
|---|---|---|---|---|---|
| (1) Vibration | Package, Non-Operating | (1) Sine wave<br>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<br>5 ~100 Hz, 0 dB/Oct. 0.015 $g^2$/Hz<br>100 ~200 Hz, -6 dB/Oct.<br>200 Hz, 0.0038 $g^2$/Hz<br>Equivalent to 1.47 Grms, All primary axis, 20 min per-orientation, total is 60 min. | | | |
| | | (3) Procedure:<br>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:<br>20 Hz 0.0185(g2/Hz)<br>200Hz 0.0185(g2/Hz)<br>Duration : 5 Minutes<br>Axis : 3 axis ( Horizontal and Vertical axis ,Z axis) | √ | | |
| (3) Drop | Package, Non-Operating | 91 cm Height (MP stage)<br>(1 corner, 3 edges, 6 faces) | √ | | |
| (4) Shock | Wooden package, Non-Operating | Waveform: half sine<br>Faces: 6 sides/ per orientation<br>3 shocks.<br>Duration: <3ms<br>Velocity accelerate: 75g | √ | | |

## 3.6 Electrostatic Discharge Requirements

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

## 3.7 EMC

| Item | Condition | Spec | OK | N.A | Remark |
|---|---|---|---|---|---|
| TCO03 | Electric | Band 1 < 10 V/m<br>Band 2 < 1 V/m | √ | | |
| | Magnetic | Band 1 < 200nT<br>Band 2 < 25nT | √ | | |
| EMI | FCC part 15J class B | After Mass production under | √ | | |

| | | | | | |
|---|---|---|---|---|---|
| | EN55022 class B | 1dBuv for constant measure. Besides DNSF and VCCI class-2 are optional. | | | |

### 3.8 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℃, under 7.0mA | 50,000 Hours (typ.) | √ | | 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 7.0±0.5mA lamp current.

## 4. LCD Characteristics

### 4.1 The Physical definition & Technology summary of LCD panel

| Item | Condition | Spec | OK | N.A | Remark |
|---|---|---|---|---|---|
| LCD Panel Supplier | | AUO | √ | | |
| Panel type of Supplier | | M190EN04 V.2 | √ | | |
| Screen Diagonal | | 480mm(19.0”) | √ | | |
| Display area | Unit=mm | 376.32(H) x 301.056(V) | √ | | |
| Physical Size | Unit=mm | 396(H) x 324(V) x 18(D) (typ.) | √ | | |
| Weight | Unit=gram | 2700 (typ.) | √ | | |
| Technology | | TN type | √ | | |
| Pixel pitch | Unit=mm | 0.294 x 0.294 | √ | | Per one triad |
| Pixel arrangement | | R/G/B vertical stripe | √ | | |
| Display mode | | Normally white | √ | | |
| Support color | | 262K colors (scaler dithering output 16.2M colors) | √ | | |

### 4.2 Optical characteristics of LCD panel

| Item | Unit | Conditions | Min. | Typ. | Max. | Remark |
|---|---|---|---|---|---|---|
| Viewing Angle | [degree] | Horizontal (Right) | 65 | 70 | - | |
| | [degree] | CR = 10 (Left) | 65 | 70 | - | |
| | [degree] | Vertical (Up) | 65 | 70 | - | |
| | [degree] | CR = 10 (Down) | 60 | 65 | - | |
| Contrast ratio | | Normal Direction | 250 | 450 | | |
| Response Time | [msec] | Rising Time | - | 3.6 | 6.3 | |
| | [msec] | Falling Time | - | 8.4 | 14.7 | |
| | [msec] | Rising + Falling | - | 12 | 21 | |
| Color / Chromaticity Coordinates (CIE) | | Red x | 0.604 | 0.634 | 0.664 | |
| | | Red y | 0.324 | 0.354 | 0.384 | |
| | | Green x | 0.27 | 0.3 | 0.3 | |
| | | Green y | 0.585 | 0.615 | 0.645 | |
| | | Blue x | 0.108 | 0.138 | 0.168 | |
| | | Blue y | 0.047 | 0.077 | 0.107 | |
| Color Coordinates (CIE) White | | White x | 0.28 | 0.31 | 0.34 | |
| | | White y | 0.30 | 0.33 | 0.36 | |
| Luminance Uniformity | [%] | 9 points measurement | 70 | 75 | - | |

| | | | | | | |
|---|---|---|---|---|---|---|
| White Luminance @ CCFL 7.5mA (center) | [cd/m$^2$] | | 200 | 250 | - | |
| Crosstalk (in 75Hz) | [%] | | | | 1.5 | |

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

# 5. User Controls

## 5.1 User's hardware control definition

| Item | Condition | Spec | OK | N.A | Remark |
|---|---|---|---|---|---|
| Power button | | | √ | | |
| Enter button | | | √ | | |
| Right/Inc. button | | | √ | | |
| Left/Dec. button | | | √ | | |
| Exit /Volume or Input Select button | | | √ | | |
| iKey button | | | √ | | |
| Mode button | | | | √ | |
| Mute button | | | | √ | |

## 5.2 OSD control function definition

| Item | Condition | Spec | OK | N.A | Remark |
|---|---|---|---|---|---|
| Auto Adjust | | Auto-Geometry | √ | | |
| Brightness | | | √ | | |
| Contrast | | | √ | | |
| Horizontal Position | | | √ | | |
| Vertical Position | | | √ | | |
| Pixel Clock | | | √ | | |
| Phase | | | √ | | |
| Color | | Bluish<br>Reddish<br>Normal<br>User: Separate R/G/B adjustment | √ | | |
| OSD Position | | OSD Horizontal position<br>OSD Vertical position | √ | | |
| OSD Time | | From 5 sec to 60 sec | √ | | |
| Language | | 8 languages | √ | | |
| Recall | | Color recall<br>Recall All | √ | | |
| Mode | | | | √ | |
| Input Select | | D-sub<br>DVI | √ | | |
| Sharpness | | | √ | | |

| | | | | | |
|---|---|---|---|---|---|
| Display Information | | For input timing | √ | | |
| Volume | | | | √ | |
| Mute | | | | √ | |
| Hot key for Brightness | | | √ | | |
| Hot key for Contrast | | | √ | | |
| Hot key for Volume | | | | √ | |
| Hot key for Input Select | | | √ | | |
| Hot key for Mode | | | | √ | |

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

# 6. Mechanical Characteristics

## 6.1 Dimension

| Item | Condition | Spec | OK | N.A | Remark |
|---|---|---|---|---|---|
| Bezel opening | | **378.2 x 302.9 mm** | √ | | |
| Monitor without Stand | L x W x H mm | **356.5*422.2*63.5mm** | √ | | |
| Monitor with Stand | L x W x H mm | **410.1*422.2*168 mm** | √ | | |
| Carton Box (outside) | L x W x H mm | **495 x 491x 157mm** | √ | | |
| Tilt and Swivel range | | Tilt: -5 ~ +20 degree<br>Swivel: 0 degrees | √ | | |

## 6.2 Weight

| Item | Condition | Spec | OK | N.A | Remark |
|---|---|---|---|---|---|
| Monitor (Net) | | **5.1 Kg** | √ | | |
| Monitor with packing (Gross) | | **6.8 Kg** | √ | | |

## 6.3 Plastic

| Item | Condition | Spec | OK | N.A | Remark |
|---|---|---|---|---|---|
| Flammability | | **94-HB** | √ | | |
| Heat deflection To | **ABS** | 65 ℃ | √ | | |
| UV stability | **ABS** | **Delta E < 8.0** | √ | | |
| Resin | | MPRII: **ABS**<br>(VW55/VE0856/D350) | √ | | |
| Texture | | **MT-11020** | √ | | Bezel texture<br>MT-11010 |
| Color | | **BCS-Y5003A** | √ | | Bezel painting<br>T8020C |

### 6.4 Carton

| Item | Condition | Spec | OK | N.A | Remark |
|---|---|---|---|---|---|
| Color | | Kraft | √ | | |
| Material | | C Flute | √ | | |
| Compression strength | | 396 KGF | √ | | |
| Burst Strength | | 16 KGF/cm$^2$ | √ | | |
| Stacked quantity | | 13 Layers | √ | | |

## 7. Pallet & Shipment

### 7.1 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' | **600** | **Pallet A: 60** | **Pallet A: 10** |
| | | | | |
| | 40' | **1440** | **Pallet A: 60** | **Pallet A: 24** |
| | | | | |
| Without pallet | 20' | **600** | X | X |
| | | | X | X |
| | 40' | **1440** | X | X |
| | | | X | X |

### 7.2 Carton Specification

**Product:**

| Net Weight (Kg) | Gross Weight (Kg) | Dimension w/o Base L*W*H (mm) | Dimension w/ Base L*W*H (mm) |
|---|---|---|---|
| **5.1Kg** | **6.8Kg** | **356.5*422.2*63.5mm** | **410.1*422.2*168 mm** |

**Package:**

| Carton Interior Dimension (mm) L*W*H | Carton External Dimension (mm) L*W*H |
|---|---|
| **485 x 481 x 139** | **495 x 491x 157** |

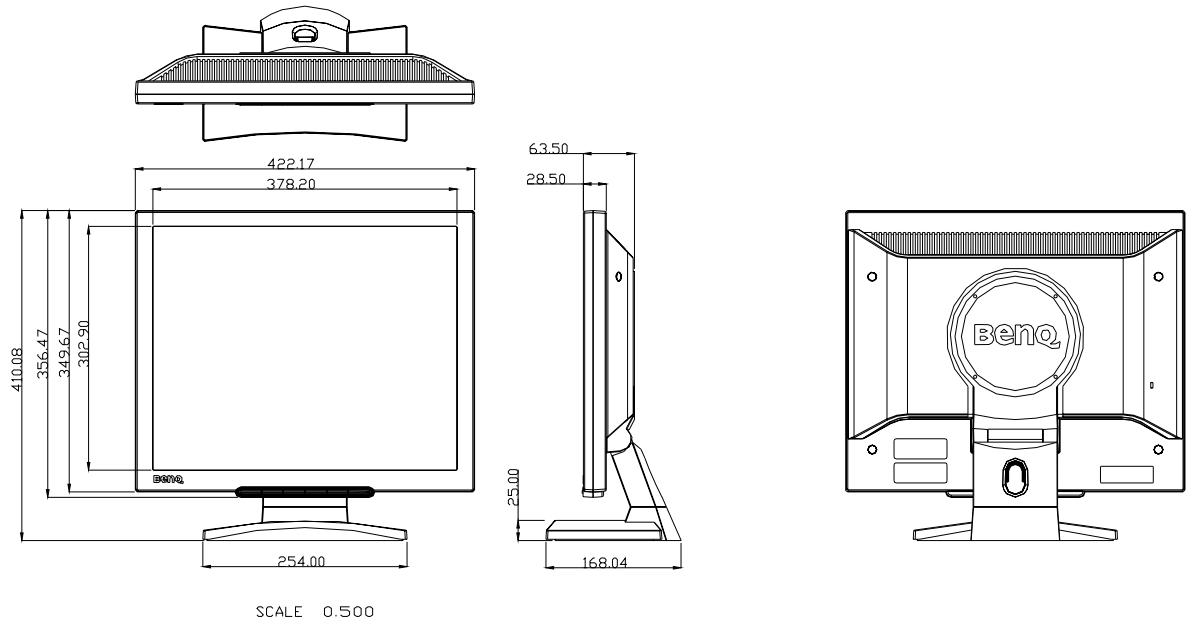
## 8. Certification

| 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 | | √ | | |
| PC-Monitor | Microsoft Windows | PC98/99 | √ | | |
| | DPMS | VESA | √ | | |
| | DDC 2B | Version 1.3 | √ | | |
| | USB | External | | √ | |
| Safety | UL (USA) | UL60950 3rd edition | | √ | |
| | CSA (Canada) | CAN/CSA-C22.2 No. 60950 | √ | | |
| | Nordic / D.N.S.F | EN60950 | | √ | |
| | FIMKO | EN60950 | √ | | |
| | CE Mark | 73/23/EEC | √ | | |
| | IEC60950 | | √ | | |
| | EN60950 | | √ | | |
| | CB | EN60950 | √ | | |
| | TUV/GS | EN60950 / EK1-ITB 2000:2003 | √ | | |
| | CCC (China) | | √ | | |
| | GOST | EN60950 | √ | | |
| | SASO | | √ | | |
| EMC | 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 | √ | | |
| X- Ray Requirement | DHHS (21 CFR) | USA X- Ray Standard | | √ | |

| | | | | | |
|---|---|---|---|---|---|
| | DNHW | | | √ | |
| | PTB | German X- Ray standard | | √ | |
| Ergonomics | TUV / Ergo | | √ | | |
| | ISO 13406-2 | | √ | | |
| | prEN50279 | | √ | | |

## Appendix: Physical Dimension Front View and Side view

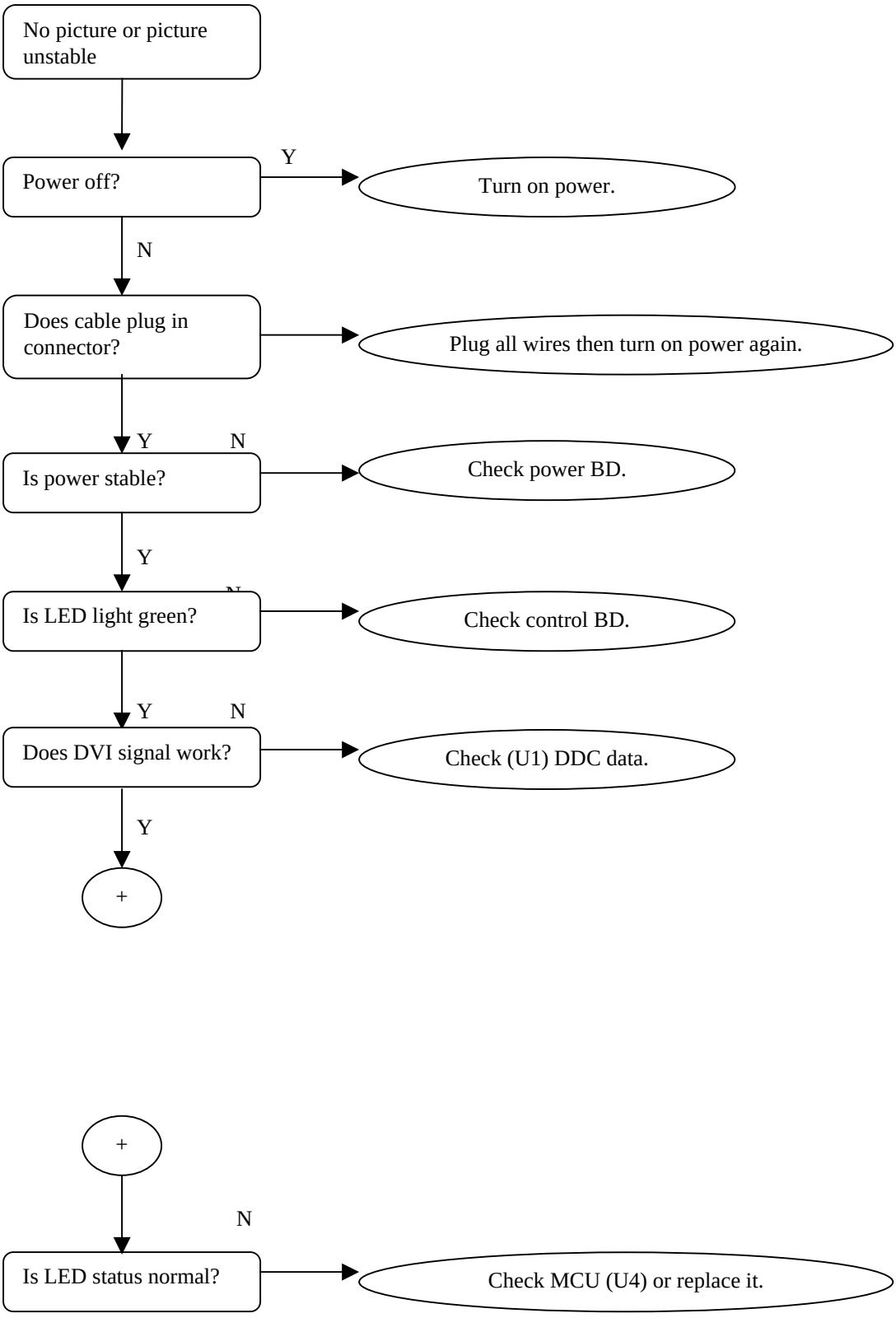
Fig. 1 Physical Dimension Front View and Side view

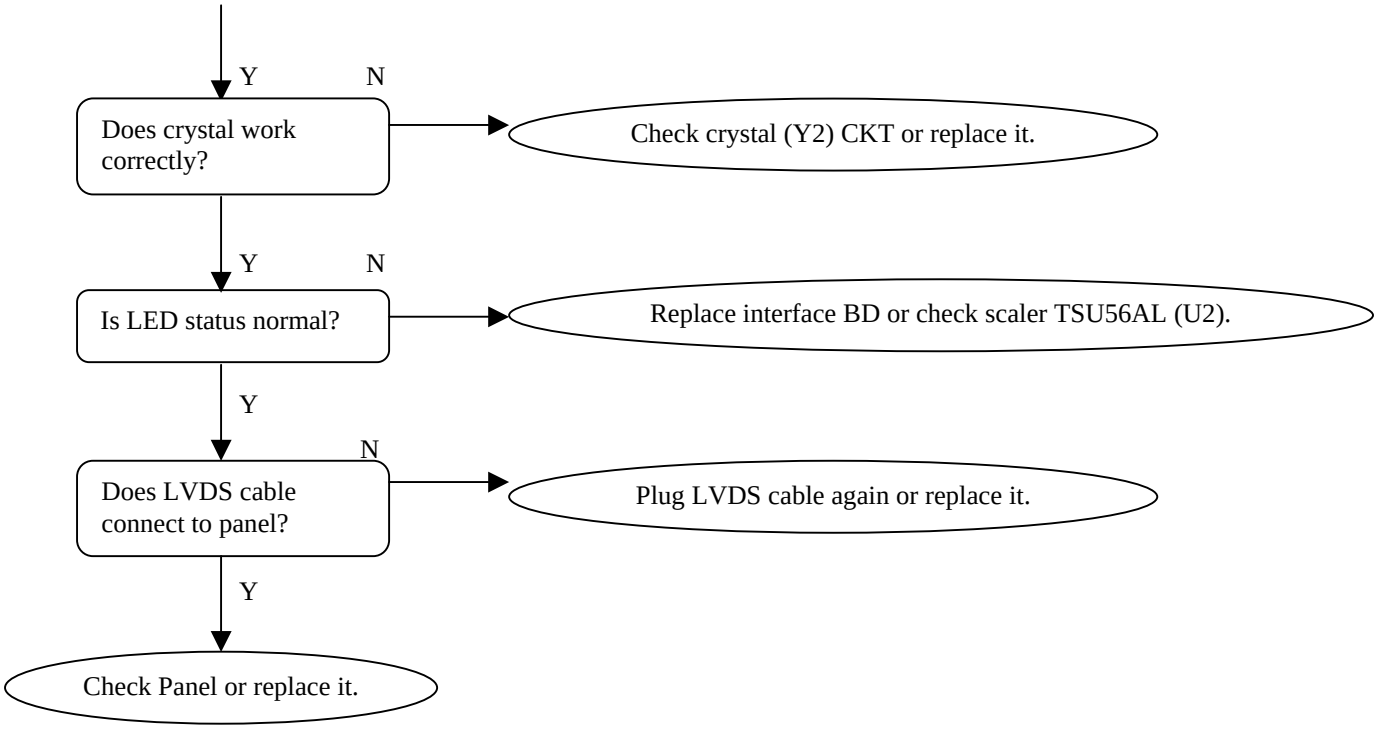


# Q9T4 TROUBLE SHOOTING GUIDE

## 1. No Display or display is unstable

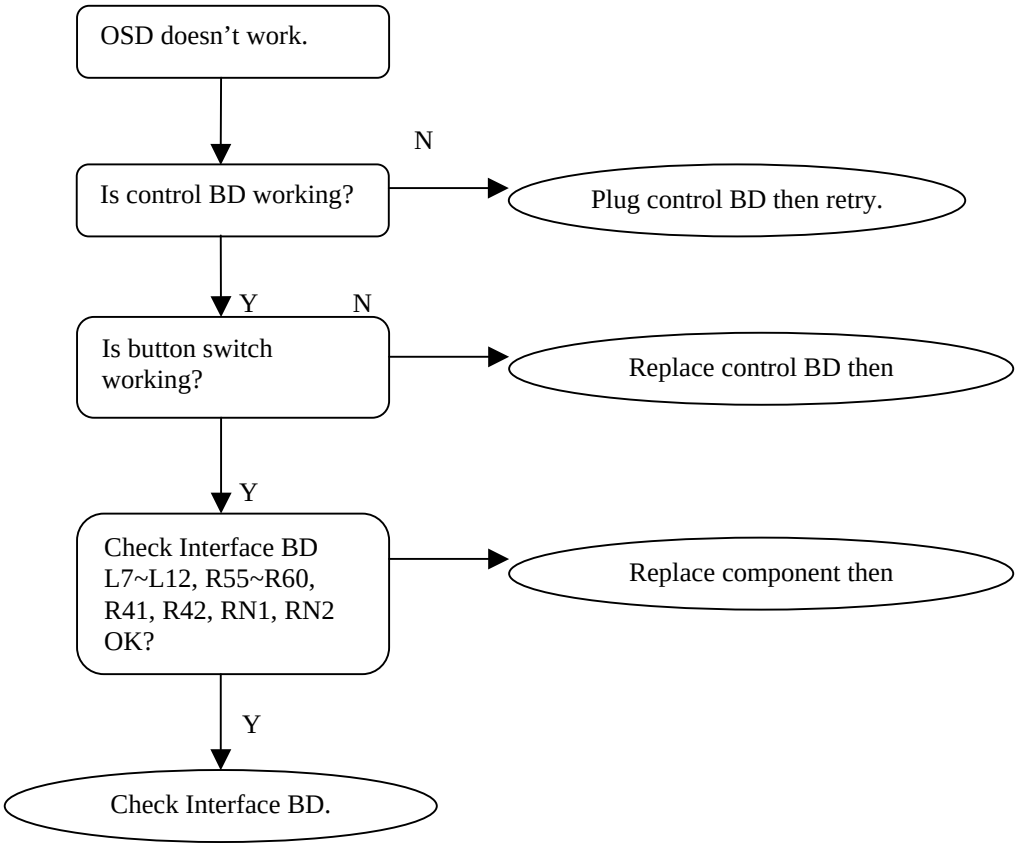
**Interface Board -**



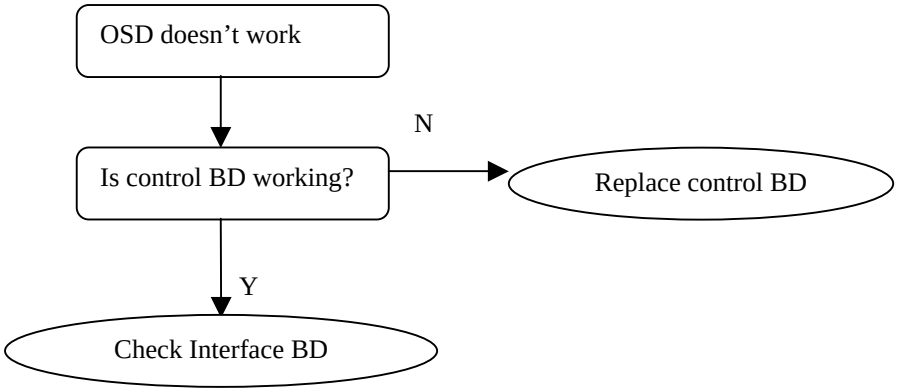

Y
N
Does crystal work correctly?
Check crystal (Y2) CKT or replace it.
Y
N
Is LED status normal?
Replace interface BD or check scaler TSU56AL (U2).
Y
N
Does LVDS cable connect to panel?
Plug LVDS cable again or replace it.
Y
Check Panel or replace it.

## 2. BUTTON function

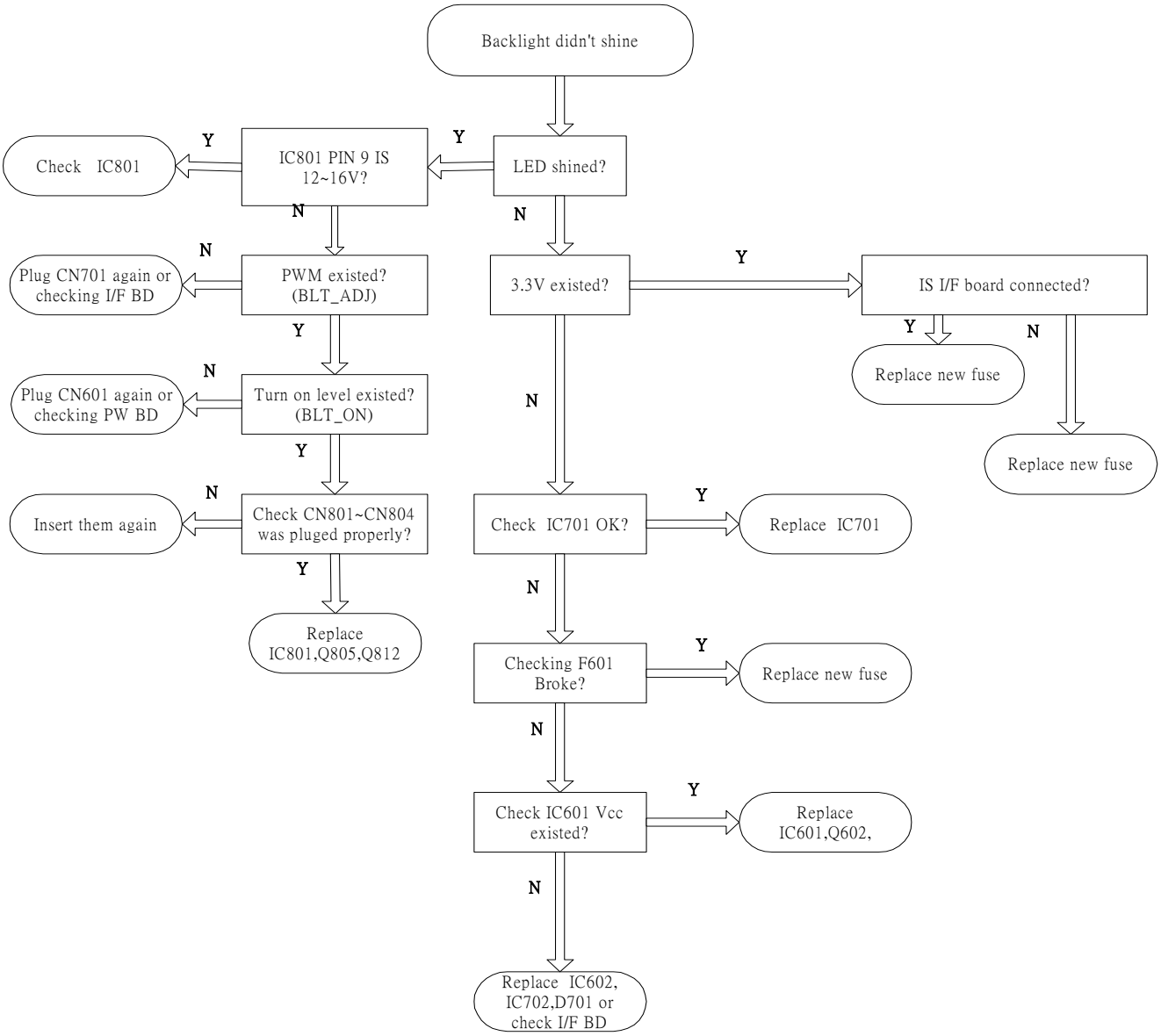
**Control board -**



### 3. OSD function



## 4. Power Board



## Table of Contents

# 1. Alignment procedure (for function adjustment)

**The list of necessary alignment for a LCD monitor**

| Items | Description | Remark |
|---|---|---|
| 1 | Geometry adjustment & checking | For Preset timing modes |
| 2 | ADC calibration (White balance adjustment) | UVGA7 (1024x768/75Hz) |
| 3 | Color temperature measurement | C1/Bluish, C2/Reddish & C3/Normal |
| 4 | Writing EDID data into monitor | Analog/DVI-D |

## A. Preparation

1. Setup input timing to any preset modes or patterns.
2. Enter factory mode (press “Exit” & “Enter” & “Power” buttons at the same time to turn on monitor).
3. Press “iKey” 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.

## B. Geometry adjustment & checking (for preset timing modes)

1. Enter factory mode (press “Exit” & “Enter” & “Power” buttons at the same time to turn on monitor).
2. Select timing mode from figure-1 and input full screen display pattern to monitor.
3. Select “Auto Adjust” to run “AUTO” function for geometry adjustment.
4. Check if the position, phase and clock of the image are correct to make sure controlled functions and performance are O.K..
5. Select “Recall All ” to erase user settings.
6. Turn off the monitor power.
7. Turn on the monitor power again to check if monitor’s image settings are O.K. and with following settings.

   CONTRAST = 50

   BRIGHTNESS = 90

   COLOR = Normal (default setting)

   OSD time = 20

**Figure-1: Preset Timing modes list**

| Input Timing | | | | Actual Output | | | |
|---|---|---|---|---|---|---|---|
| Resolution | Horizontal Frequency (KHz) | Vertical Frequency (Hz) | Dot Clock Frequency (MHz) | Actual display Resolution | OK | N.A | Remark |
| 720x400 | 31.47(N) | 70.08(P) | 28.32 | 1280x1024 | √ | | DOS |
| 800x600 | 46.87(P) | 75.00(P) | 49.5 | 1280x1024 | √ | | VESA |
| 1024x768 | 48.36(N) | 60.00(N) | 65.00 | 1280x1024 | √ | | VESA |
| 1024x768 | 60.02(P) | 75.00(P) | 78.75 | 1280x1024 | √ | | VESA |
| 1152x870 | 68.68(N) | 75.06(N) | 100.00 | 1280x1024 | √ | | Mac |
| 1152x900 | 71.81(N) | 76.14(N) | 108.00 | 1280x1024 | √ | | VESA |
| 1280x1024 | 80.00(P) | 75.00(P) | 135.00 | 1280x1024 | √ | | VESA |
| 1280x1024 | 81.18(N) | 76.16(N) | 135.09 | 1280x1024 | √ | | SUN |

## C. ADC calibration (White Balance)

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

1. Setup input timing UVGA7 (1024x768/75Hz), 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 "Exit" & "Enter" & "Power" buttons at the same time to turn on monitor).
3. Press "iKey" into "Burn In Mode" tag and select "On" to enable burn-in mode.
4. Change color temperature from "Normal" (default) to "User Preset".
5. Press hot-key "CONTRAST" to run "White Balance" function. (This procedure will get optimal gain/offset (clamp) values)
6. Checking if the picture is O.K., or reject this monitor and check its circuit board or wire/cable connection.

### D. Color temperature measurement

1. Setup input timing ICL-605 (1280x1024/75Hz), pattern 41 (full white color pattern) with Analog signals from Chroma video pattern generator.
2. Make sure ADC calibration (White Balance) had already been done.
3. Measure color temperature C1/Bluish, C2/Reddish & C3/Normal to meet following spec. requirement by Minolta CA-110 (or equivalent equipment).

| | | |
|---|---|---|
| Color temperature (C1/9300K/Bluish set on OSD) | X+- | 0.283+(-) 0.03 |
| | Y+- | 0.297+(-) 0.03 |
| Color temperature (C2/5800K/Reddish set on OSD) | X+- | 0.326+(-) 0.03 |
| | Y+- | 0.342+(-) 0.03 |
| Color temperature (C3/6500K/sRGB set on OSD) | X+- | 0.313+(-) 0.03 |
| | Y+- | 0.329+(-) 0.03 |

4. 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. | Remark |
|---|---|---|---|---|---|---|---|
| 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 | √ | | |
| 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 | √ | | Base on current color index to read back the right gain value. |
| Read Green Gain from MCU RAM by color index | C3 | 58 | XX | cksum | √ | | |
| Read Blue Gain from MCU RAM by color index | C3 | 59 | XX | cksum | √ | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 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 Cx R-Gain Data to EEPROM | AA | 7C | Data | cksum | | √ | |
| Write Cx G-Gain Data to EEPROM | AA | 7D | Data | cksum | | √ | Reserved for some model have extra color temperature |
| Write Cx 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 | 0~4 | cksum | √ | | 1=C1/9300/Bluish,<br>2=C2/6500/Normal,<br>3=C3/5800/Reddish,<br>4=User, 5=Cx |
| Write OSD-Hpos to EEPROM | AA | 95 | Data | cksum | √ | | |
| Write OSD-Vpos to EEPROM | AA | 96 | Data | cksum | √ | | |
| Write Language to EEPROM | AA | 97 | 0~7 | cksum | √ | | 0=DE, 1=EN, 2=ES, 3=FR,<br>4=IT, 5=JA, 6=繁中, 7=簡中<br>(Also Update MCU RAM) |
| 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 |
| Write OSD Transparency to EEPROM | AA | 9E | Data | cksum | | √ | |
| Write OSD Rotation to EEPROM | AA | 9F | Data | cksum | | √ | |
| 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 Cx R-Gain data from EEPROM | A3 | 7C | XX | cksum | | √ | Reserved for some model have |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Read Cx G-Gain data from EEPROM | A3 | 7D | XX | cksum | | √ | extra color temperature |
| Read Cx B-Gain data from EEPROM | A3 | 7E | XX | cksum | | √ | |
| 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=Cx |
| Read OSD-Hpos EEPROM | A3 | 95 | XX | cksum | √ | | |
| Read OSD-Vpos from EEPROM | A3 | 96 | XX | cksum | √ | | |
| Read Language from EEPROM | A3 | 97 | XX | cksum | √ | | 0=DE, 1=EN, 2=ES, 3=FR, 4=IT, 5=JA, 6=繁中, 7=簡中 |
| 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 | | √ | For model with Gamma curve selection function |
| Read OSD Transparency from EEPROM | A3 | 9E | XX | cksum | | √ | |
| Read OSD Rotation from EEPROM | A3 | 9F | XX | cksum | | √ | |
| Change Color Temp. to C1/9300K/Bluish | CC | 01 | XX | cksum | √ | | Change C/T immediately. And store C/T index to EEPROM. |
| 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 Cx | CC | 05 | XX | cksum | | √ | Reserved |
| 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 | √ | | Store data to EEPROM |
| Off burn in mode | CE | XX* | XX | cksum | √ | | XX* = Non "1" value Store data to EEPROM |
| Monitor is forced power saving | CF | 01 | XX | cksum | | √ | |
| Monitor wake up from power saving | CF | XX* | XX | cksum | | √ | XX* = Non "1" value |
| 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 |
| | | | | | | | |
| **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) |
| Read EEPROM Bank 3 | B3 | Address | XX | cksum | | √ | (For 24C08 type) |
| 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) |
| Write EEPROM Bank 3 | BB | Address | Data | cksum | | √ | (For 24C08 type) |

Note A: Byte4 (cksum) = Byte1 + Byte2 + Byte3

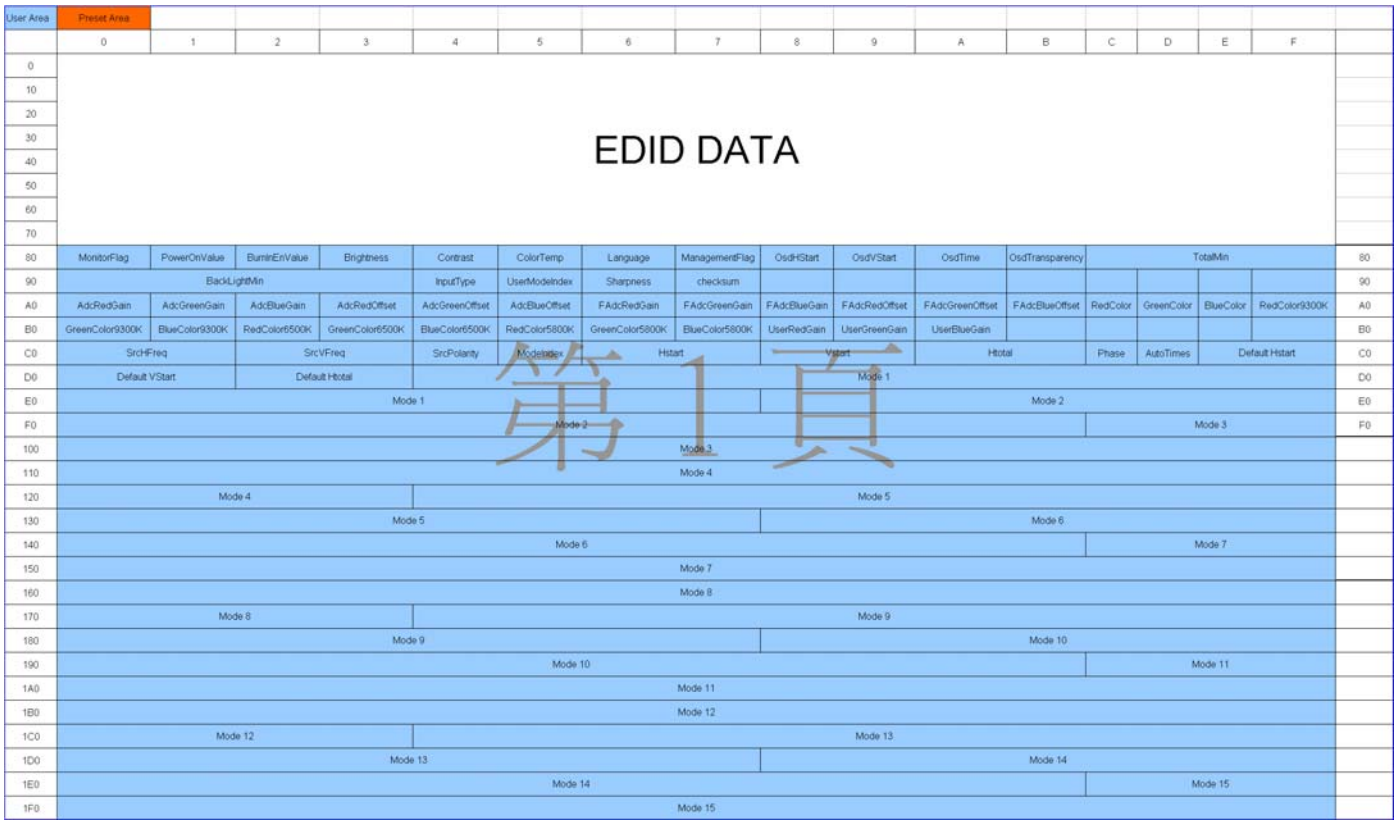
Note B: Data = The value write to MCU or EEPROM

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

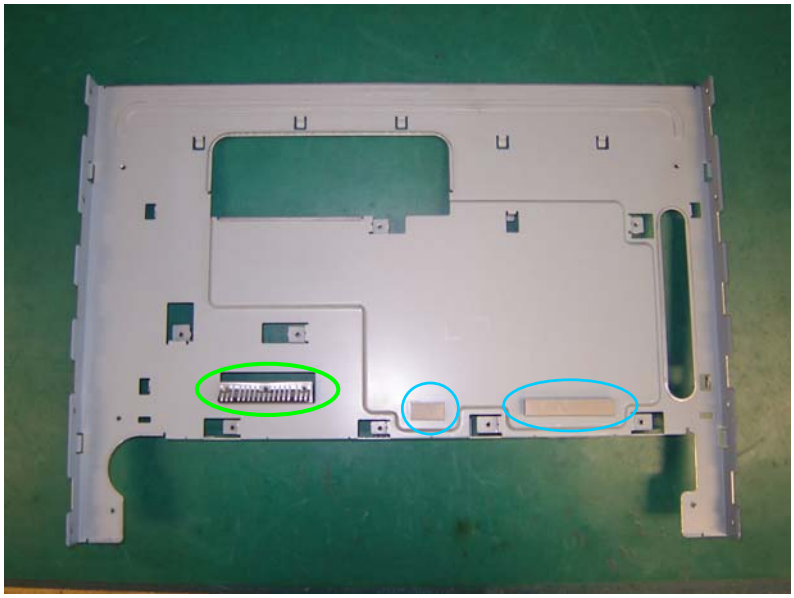
When PC Host sends 0x7D command to MCU, MCU must return as following (2 bytes)

| 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 |

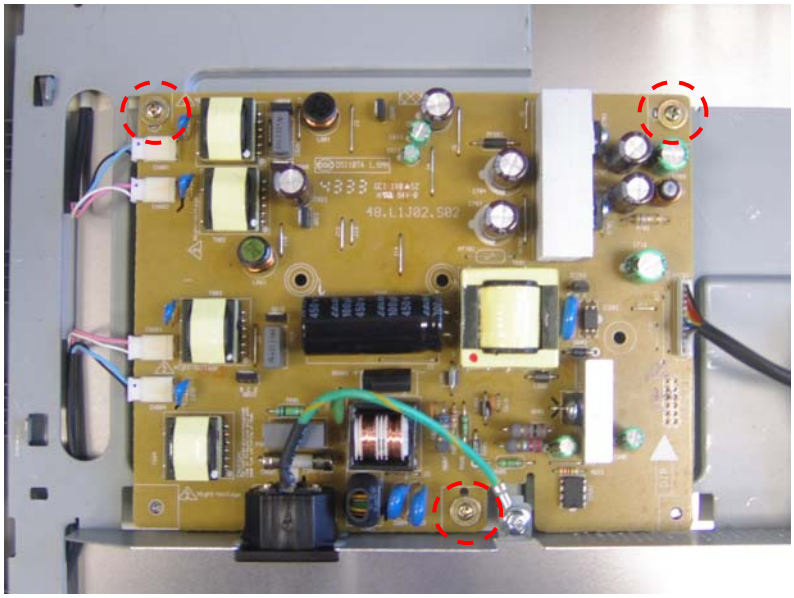
## 2. EEPROM mapping



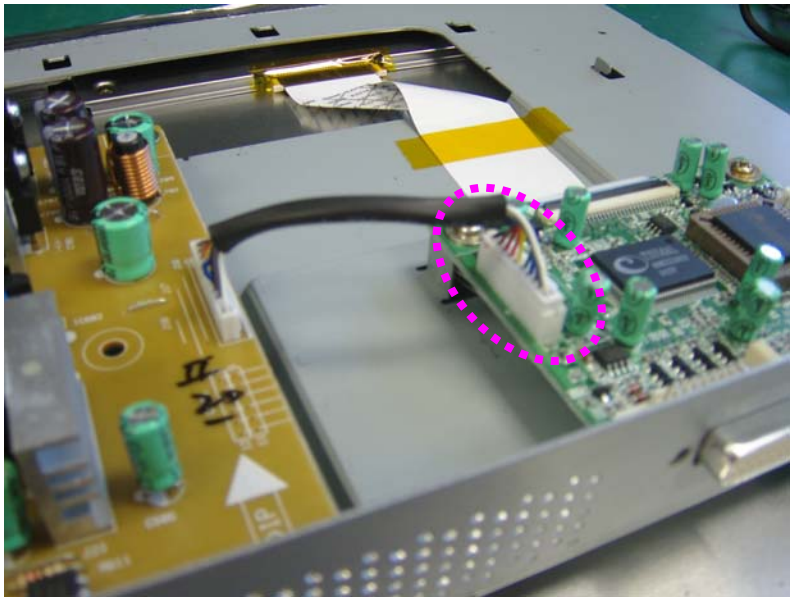
3. Wire Dressing
   - Assembly note



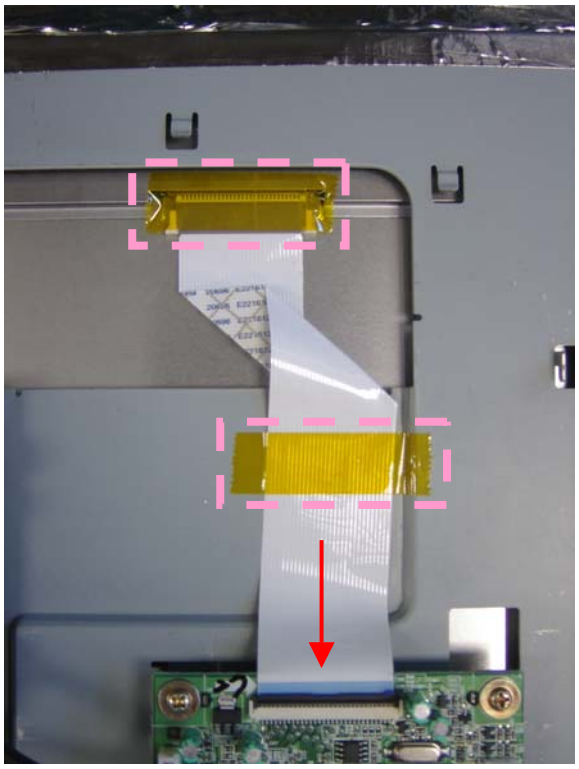
A. Make sure the spring and gaskets are attached on main bracket.



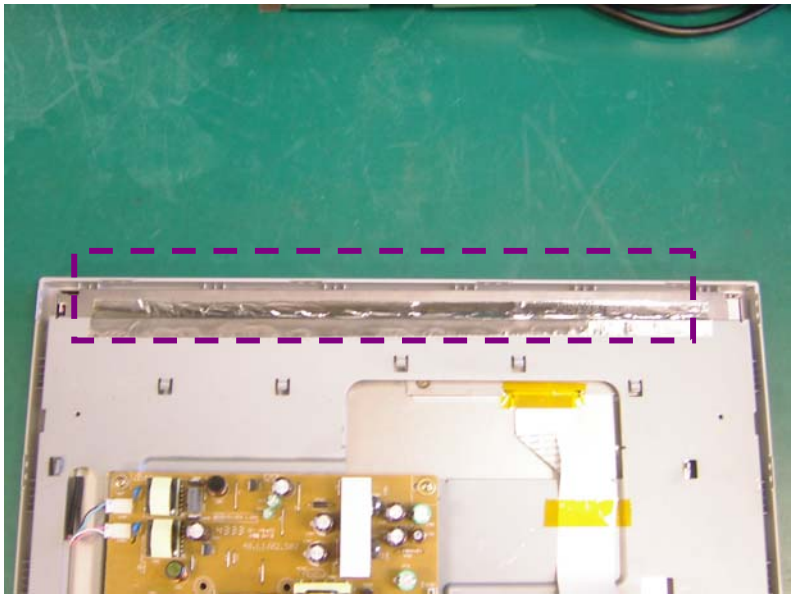
B. Screw up only 3 points on Power BD.



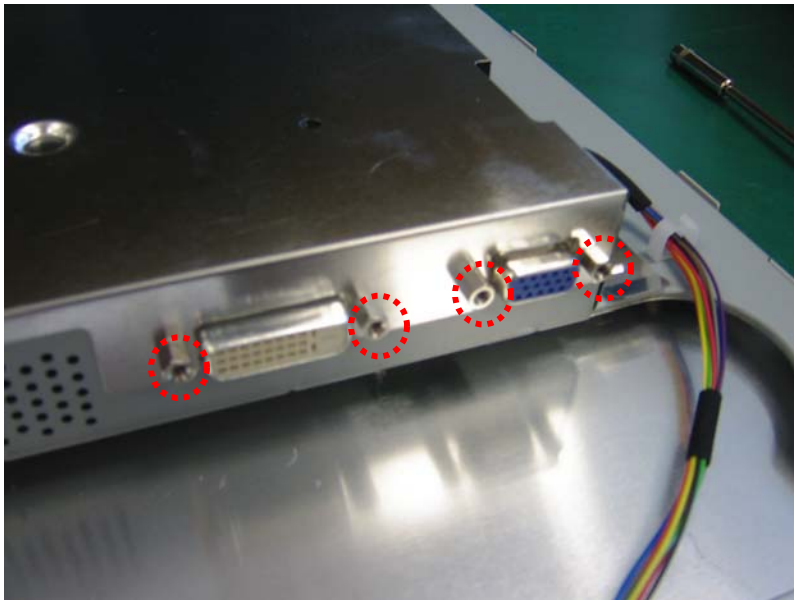
C. Connect Power BD with I/F BD by wire.



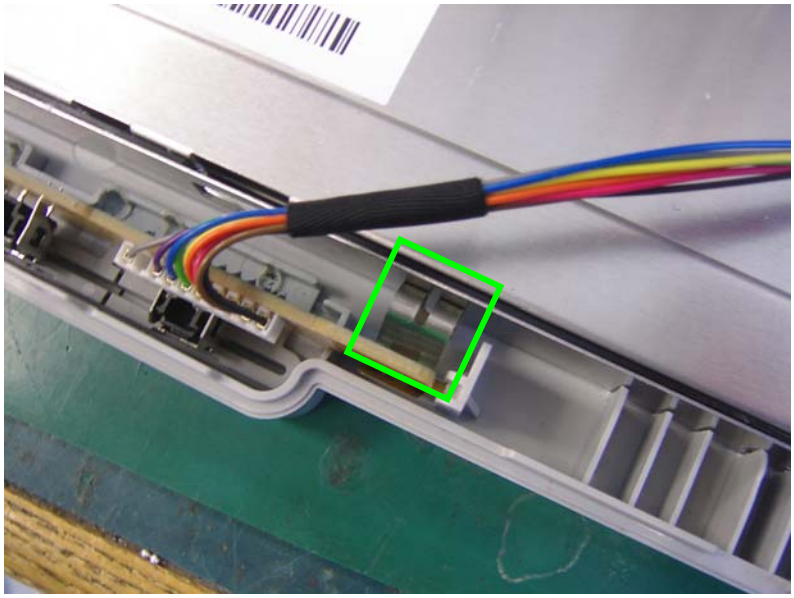
D. Stick yellow tapes on LVDS FFC.



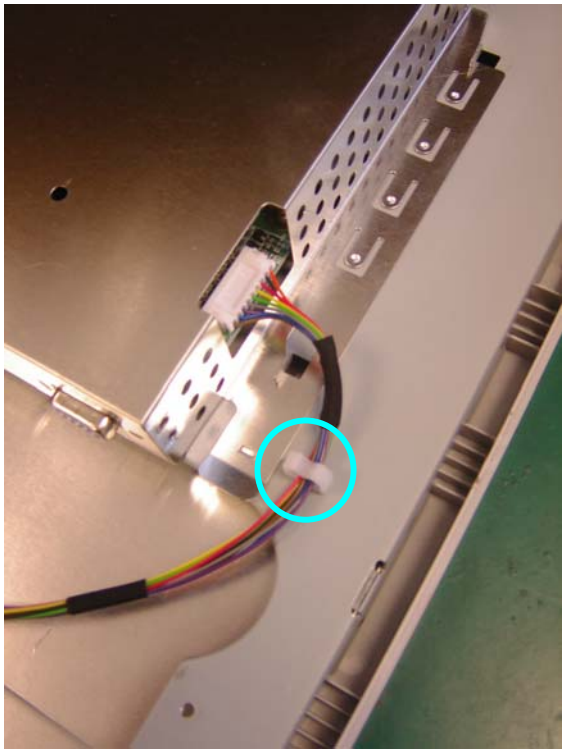
E. Stick AL foil to cover the gap between panel and main bracket.



F. Fix the main shielding by connector screws.

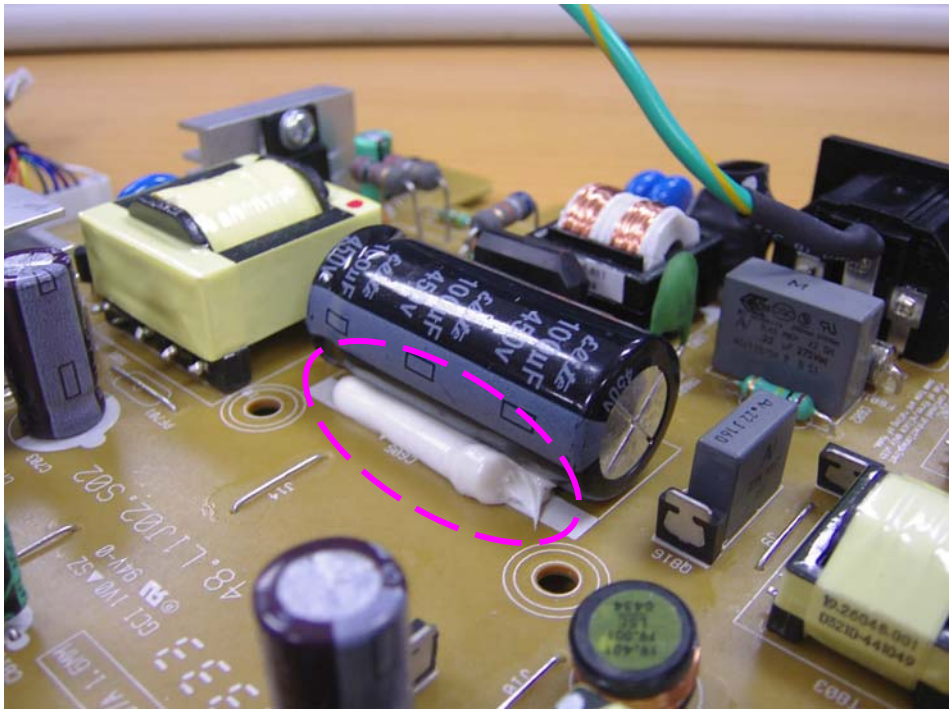


G. Add spring between Ctrl BD and panel.



H. Fix the Ctrl BD wire by clip.

4. Add Glue



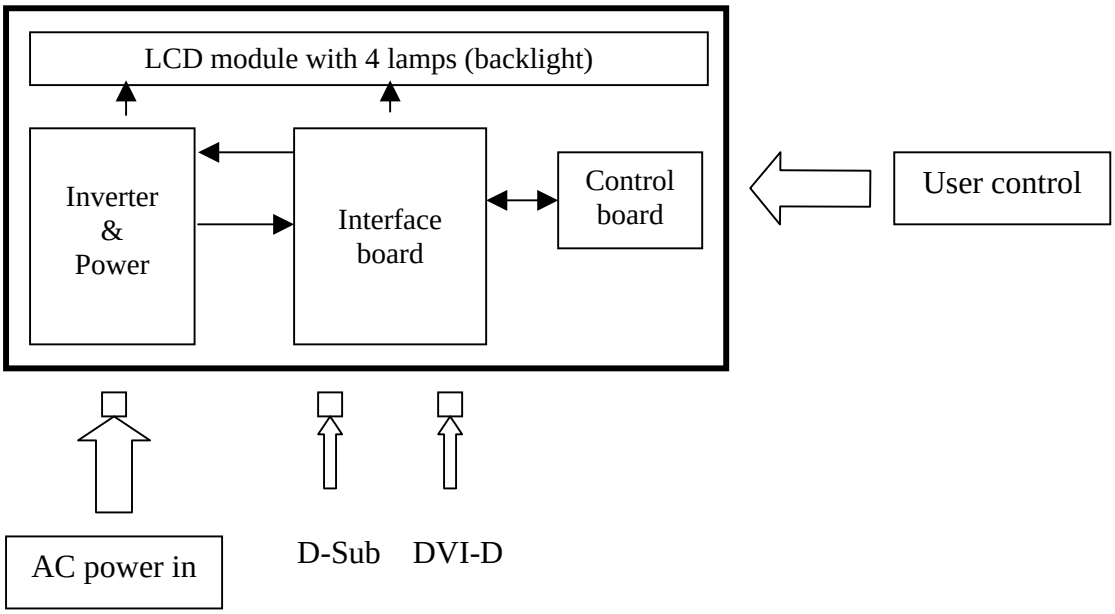
C605 (Power BD)

## I. Introduction:

The Q9T4 is a 19" SXGA (1280x1024), 262K (R/G/B 6-bit for V.2 version)/16.2M colors (R/G/B 6-bit + FRC for V.5 version) TFT LCD monitor with multi-media function. It's a Dual (analog and digital) interface LCD monitor with a 15 pins D-sub signal cable and a 24 pins DVI-D cable. It's compliant with VESA specification to offer a smart power management and power saving function. It also offers OSD menu for users to control the adjustable items and get some information about this monitor, and the best function is to offer users an easy method to set all adjustable items well just by pressing one key, we called it "iKey" which can auto adjusting all controlled items. Q9T4 also offer DDC2 function to meet VESA standard.

## II. Block diagram

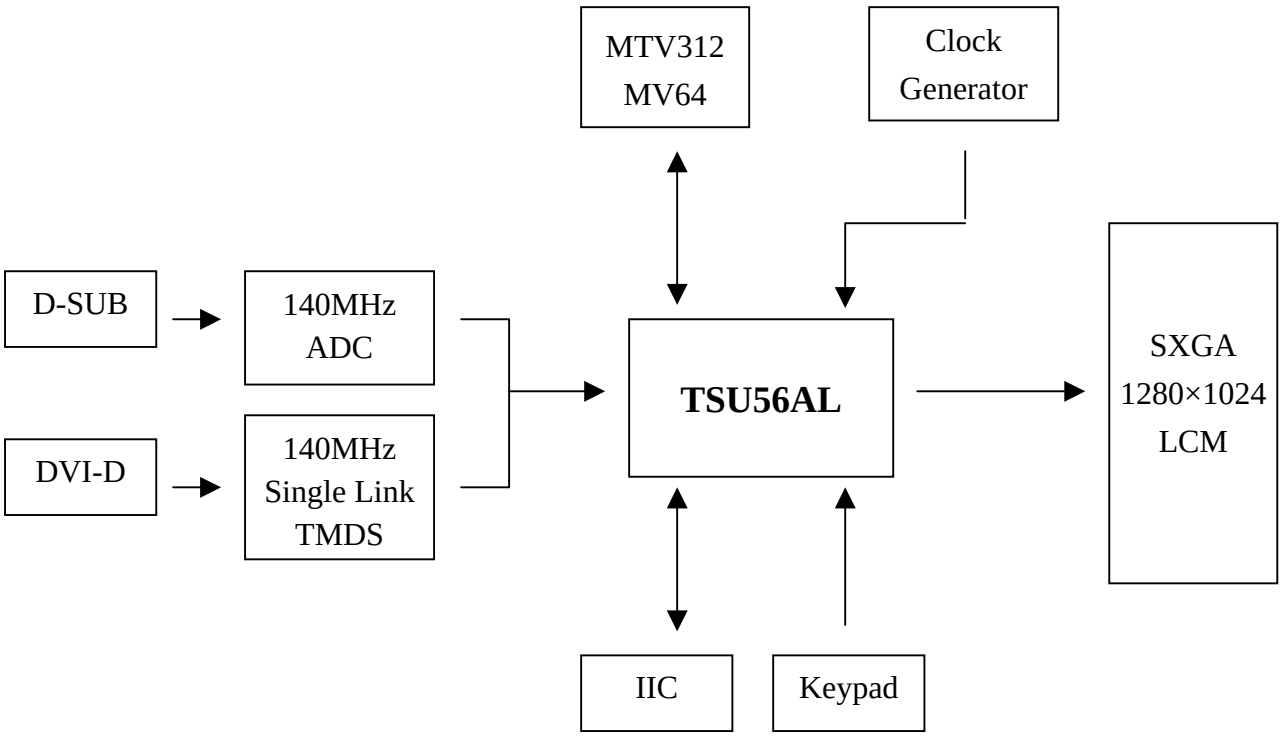
The Q9T4 consists of a head and a stand (base). The head consists of a LCD module with 4 lamps, a power board (include AC/DC, DC/DC and inverter board), a control board and an interface board. The block diagram is shown as below.



## III. Circuit operation theory:

### A.) HEAD:

#### A-1.) Interface board diagram:



**(a) Circuit operation theory:**

A basic operation theory for the interface board is to convert input signal into digital RGB. Analog RGB signal is converted to digital signal through ADC. DVI-D signal is converted through TMDS receiver. The microprocessor TSU56AL receives video data and optimizes the image automatically. It also supports input source selection, maximum 8 multi-color fonts as well as 256 color palette to form a bitmap OSD, and keypad controlling. The output data are sent to LCD module.

**(b) IC introduction:**

1) DDC (Display Data Channel) function: We use DDC IC to support DDC2B function. DDC data is stored in 24C02(EEPROM). Those data related to LCD monitor specification. PC can read them by "SDA" and "SCL" serial communication for $I^2C$ communication for DDC2B.
2) TSU56AL IC: There are A/D, Scaling and OSD functions in the TSU56AL IC. Scaling IC is revolutionary scaling engine, capable of expanding any source resolution to a highly uniform and sharp image, 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) EEPROM: We use 24C04 to store all the adjustable data and user settings, and use 24C02 to store DVI EDID data.
4) MTV312M64: MCU 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 DDC2B.

**A-2.) Power board diagram:**

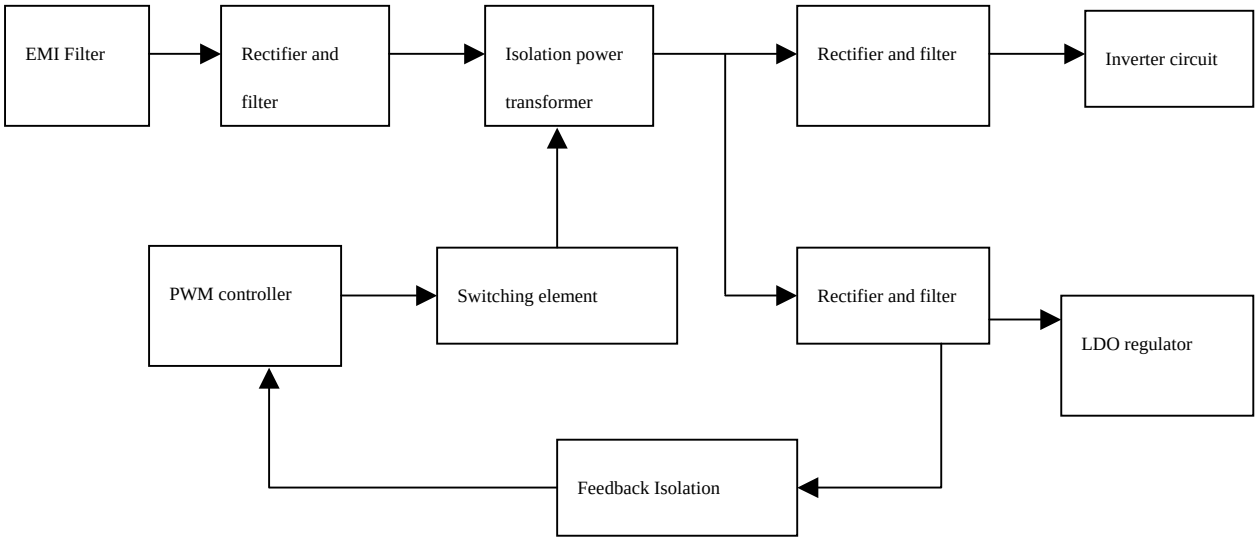



**Fig.1**

**#1 EMI Filter**

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

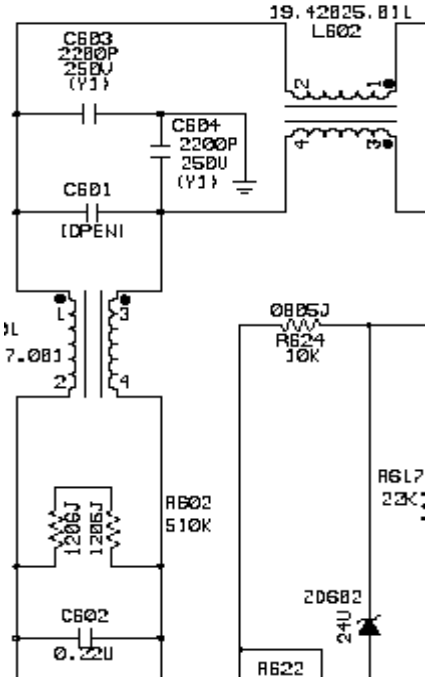



**Fig. 2**

**#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*(AC input). (See Fig.3)

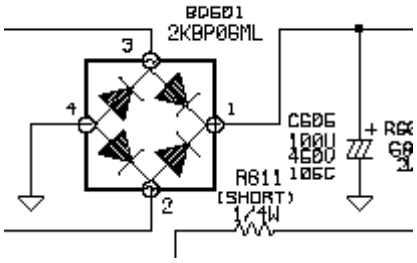



**Fig. 3**

**#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 is a voltage-snubber circuit. R615 is current sense resistor to control output power. (See Fig.4)

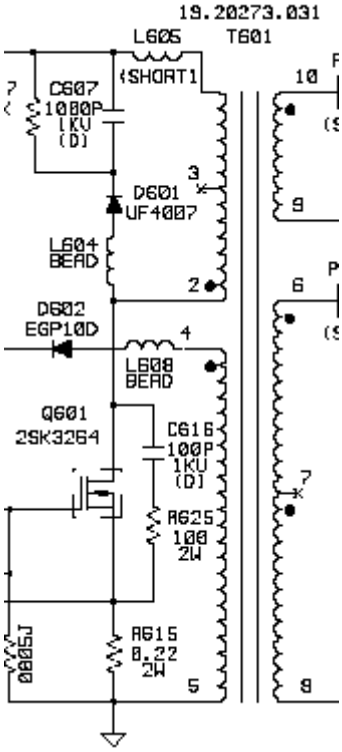



**Fig. 4**

**#4 Rectifier and filter**

D701 and C703 C704 are to produce DC output. (See Fig.5)

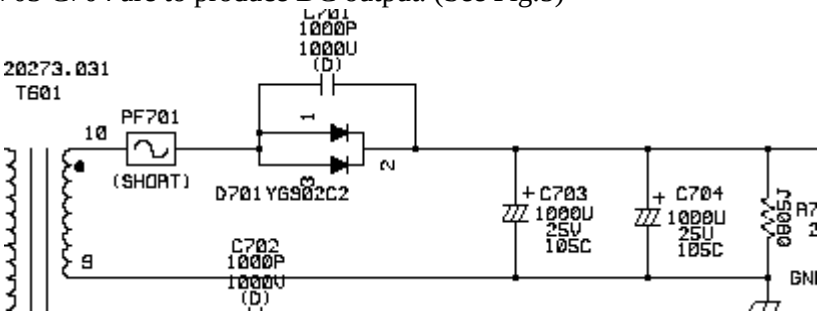



**Fig. 5**

**#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 setting-point. When the current setting-point falls below a given value. The output power demand diminish, the IC automatically enters the so-called skip cycle mode and provides excellent efficiency.

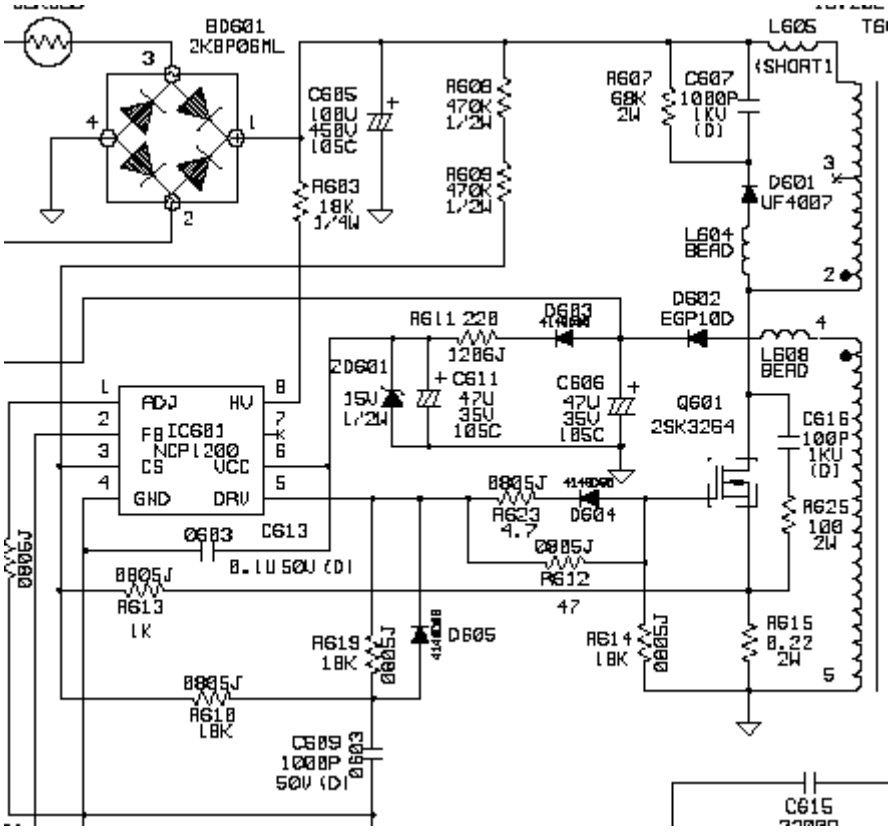



**Fig. 6**

**#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)

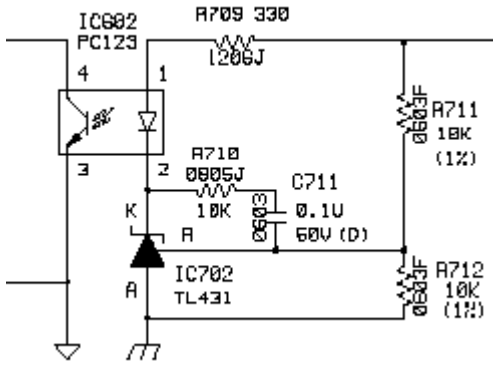
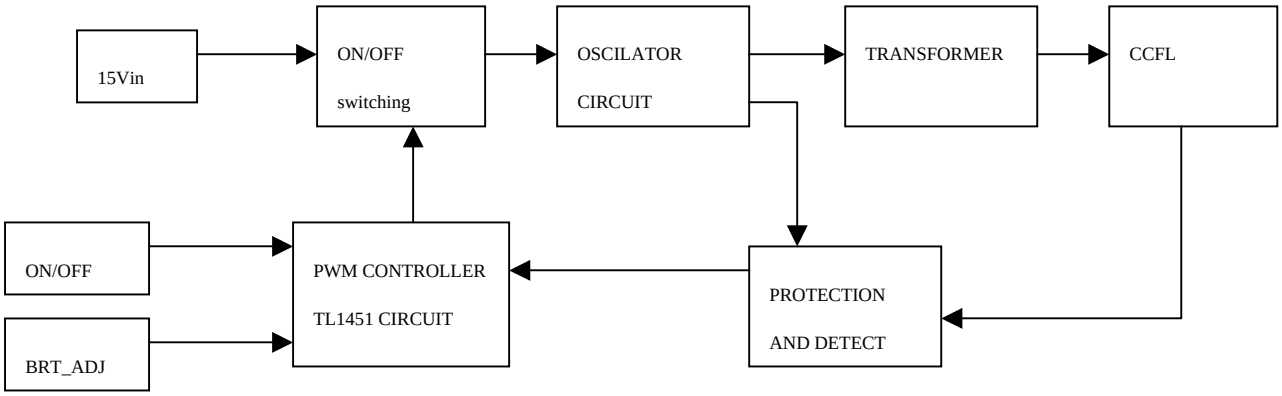



**Fig.7**

### A-3.) Inverter diagram:

#### 1.Block Diagram




#### 2. General Specification

Input Voltage: 14.5V

Input Current: 2A max.

ON/OFF Voltage: 3.3V

**Output Requirement:**

Max. Output Current: 7.5mA

Min. Output Current: 2mA

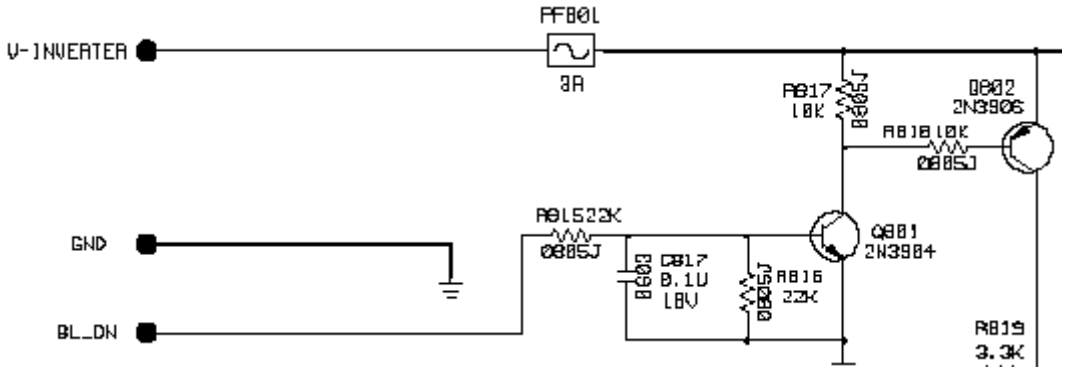
Lamp Working Voltage: 700Vrms

Open Lamp Voltage: 1900Vrms

Frequency: 40-80KHz

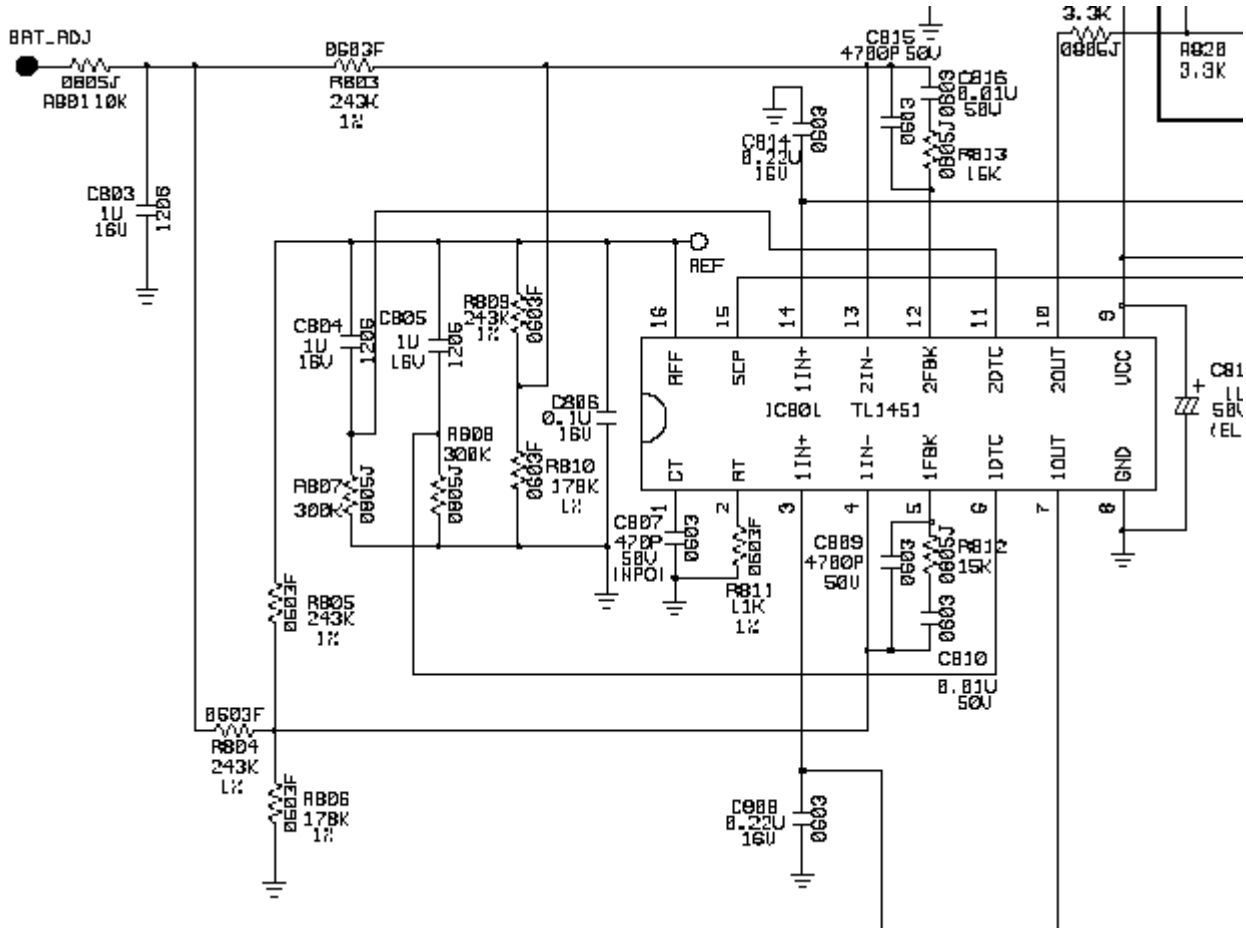
#### 3.Circuit Operation Theorem

### 3.1 ON/OFF SWITCH



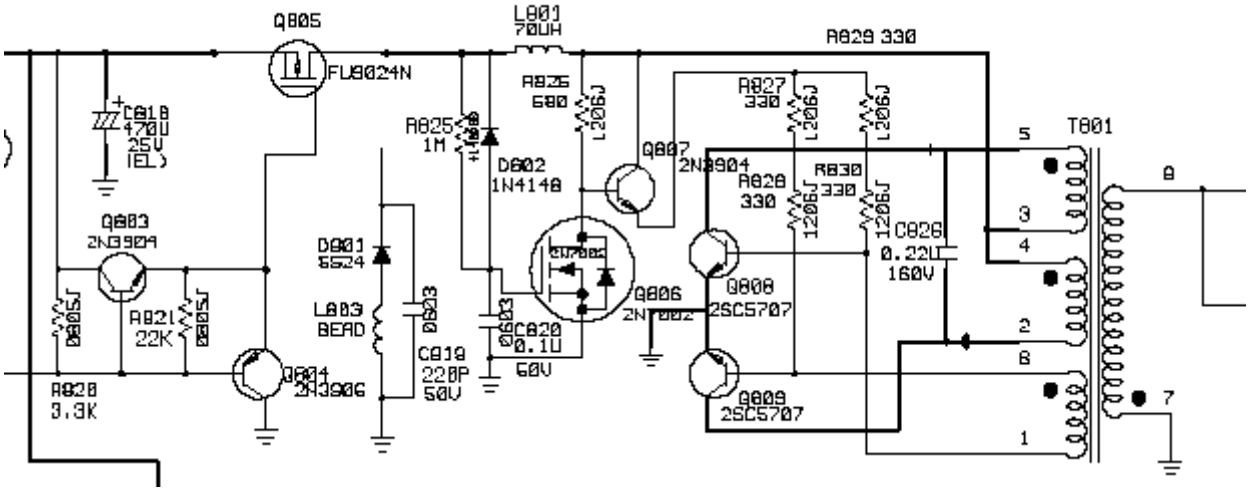

The turn-on voltage was controlled by R815 and R816.The inverter was turned on or off by the switching transistors Q801 and Q802, Also regulator IC801 is control by Q801 and Q802 decide supply 14.5V to inverter part or instead.

### 3.2 PWM Control circuit




TL1451 is a dual PWM controller. C807 and R811 decide the working frequency. BLT_ADJ signal is from control board, control pulse width then decide how much energy delivery to CCFL also decide CCFL brightness. Q803 and Q804 be the buffer to rise the drive capability and the totem poles circuit can improve a capable of driving for Q805.C813 decide the striking time delay.

### 3.3 Oscillator Circuit



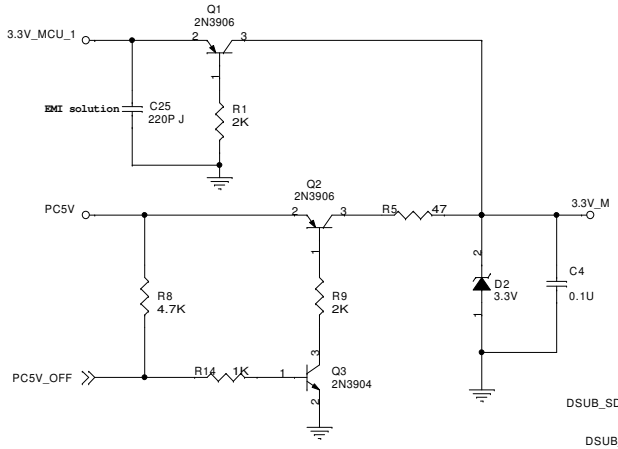

Royer circuit uses the characteristic of transformer saturation to oscillate. When the DC power inject, Q808 or Q809 will turns on, and the current Ic increases. After a period, the transistor will leave the saturation status and Vce increase. The result causes the voltage of primary coil get lower. Finally the transistor turn off, and another transistor turn on. These statuses are repeated and the pin7 and pin8 of T801 will get a Sin Wave to turn on CCFL.

**A-4.) Control board introduction:**

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

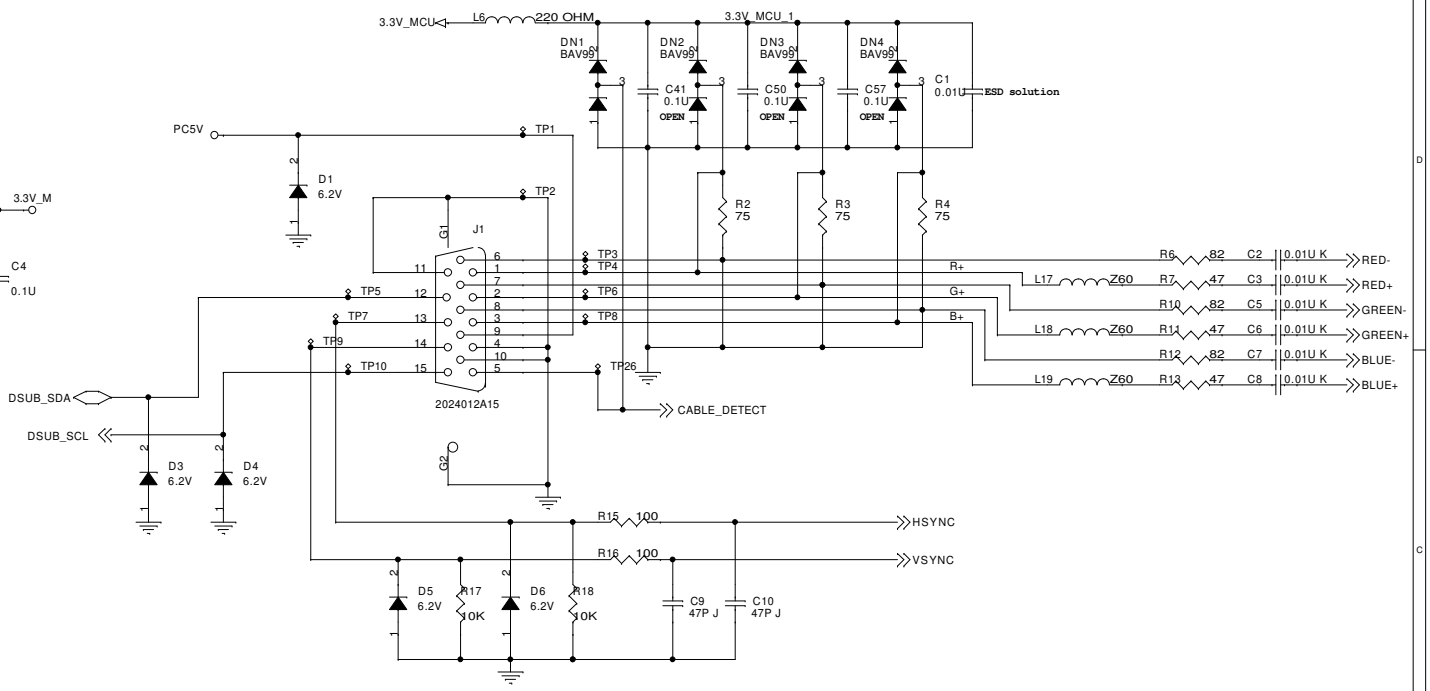
**(a) Push button:** It's a simple switch function. Pressing it for "ON" to do the auto adjustment, select (unselect) adjustment or adjusting bar.

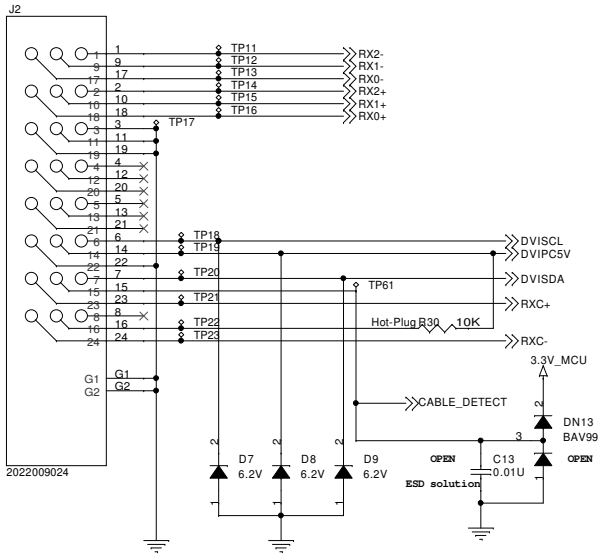
**(b) LED:** It indicates the DPMS status of this LCD monitor; green light means DPMS on (Normal operating condition), amber light means DPMS off (Power off condition).

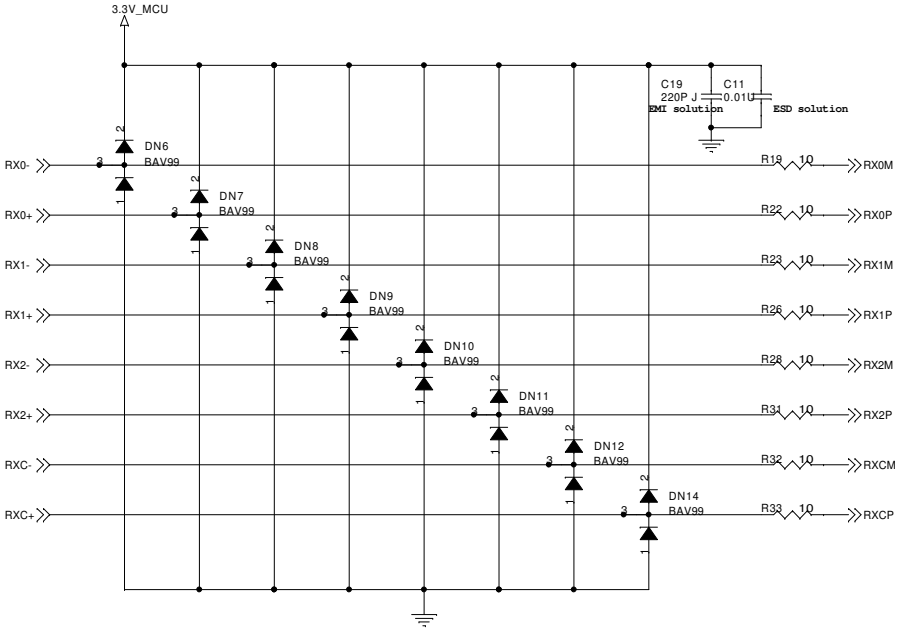


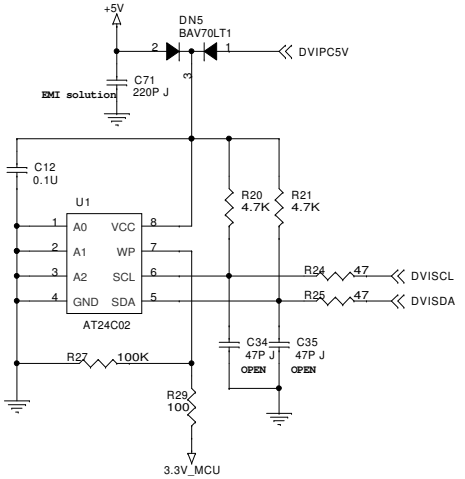

| PC5V | +3.3V | PC5V_OFF |
|---|---|---|
| + | − | H |
| + | + | L |
| − | + | Don't care |

***If both PC5V and +3.3V exist:***
***PC5V_OFF should set "LOW" to prevent PC5V from entering the system.***
***When only PC5V exists:***
***PC5V_OFF should set "HIGH" to provide CPU power.***
***Actually, in the initial state, NO PC5V_OFF, if VGA cable is connected, PC5V exists --> Q4 will ON.***
***That will make VCPU = 3.3V.***



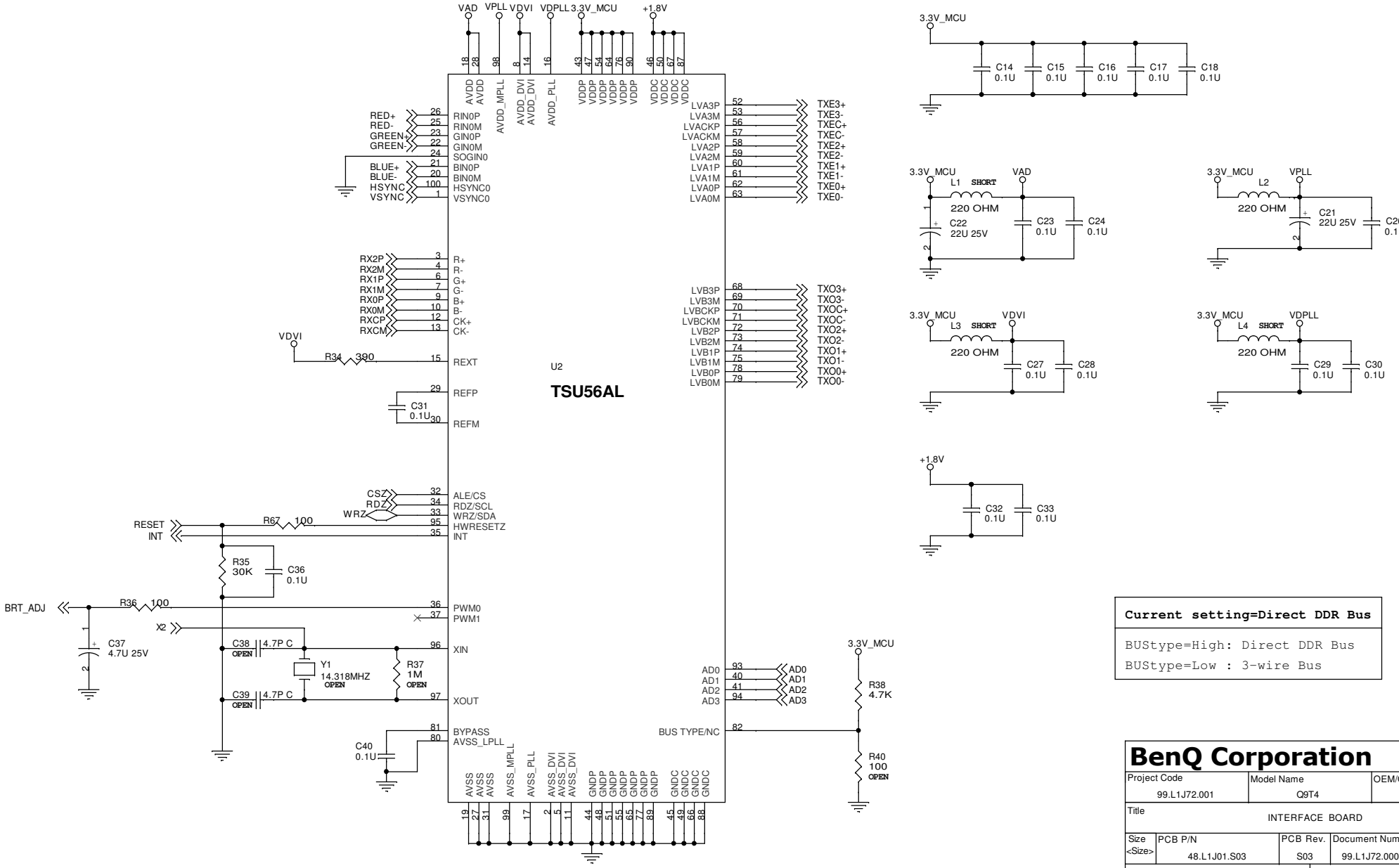




# BenQ Corporation

| Project Code | Model Name | OEM/ODM Model Name |
|---|---|---|
| 99.L1J72.001 | Q9T4 | <OEM/ODM> |

| Title | INTERFACE BOARD | | | |
|---|---|---|---|---|
| Size <Size> | PCB P/N | PCB Rev. | Document Number | Rev. |
| | 48.L1J01.S03 | S03 | 99.L1J72.000-C3-304-001 | 1 |
| Date: | Saturday, February 05, 2005 | Sheet | 1 of 5 | |

| Prepared By | Reviewed By | Approved By |
|---|---|---|
| ANGEL HU | JEFF CHI | ALLEN PC LEE |




**Current setting=Direct DDR Bus**

BUStype=High: Direct DDR Bus

BUStype=Low : 3-wire Bus

# BenQ Corporation

| Project Code | Model Name | OEM/ODM Model Name |
|---|---|---|
| 99.L1J72.001 | Q9T4 | <OEM/ODM> |

Title: INTERFACE BOARD

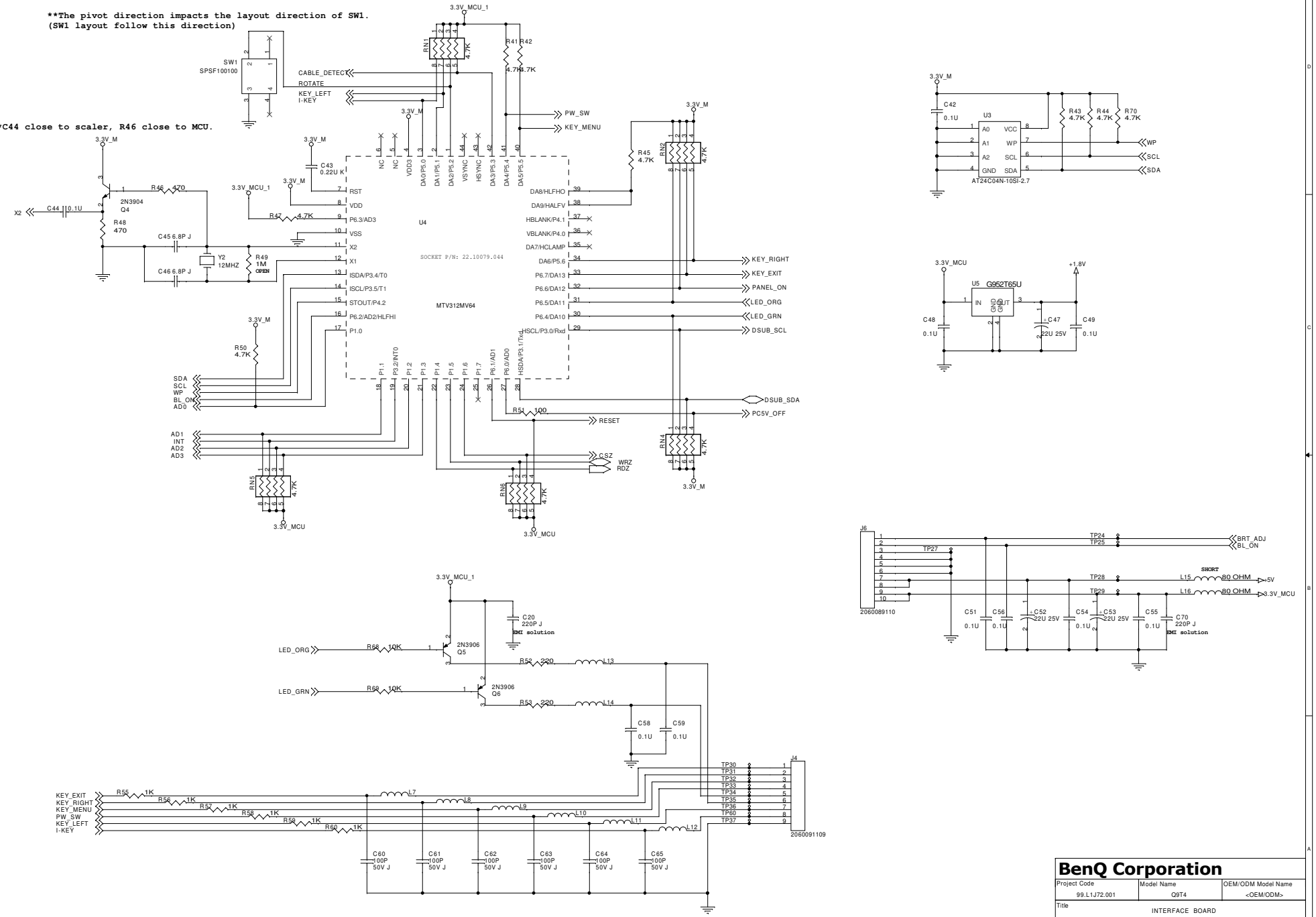
| Size | PCB P/N | PCB Rev. | Document Number | Rev. |
|---|---|---|---|---|
| <Size> | 48.L1J01.S03 | S03 | 99.L1J72.000-C3-304-001 | 1 |

Date: Saturday, February 05, 2005 Sheet 2 of 5

| Prepared By | Reviewed By | Approved By |
|---|---|---|
| ANGEL HU | JEFF CHI | ALLEN PC LEE |

**The pivot direction impacts the layout direction of SW1.
(SW1 layout follow this direction)

**C44 close to scaler, R46 close to MCU.




**BenQ Corporation**

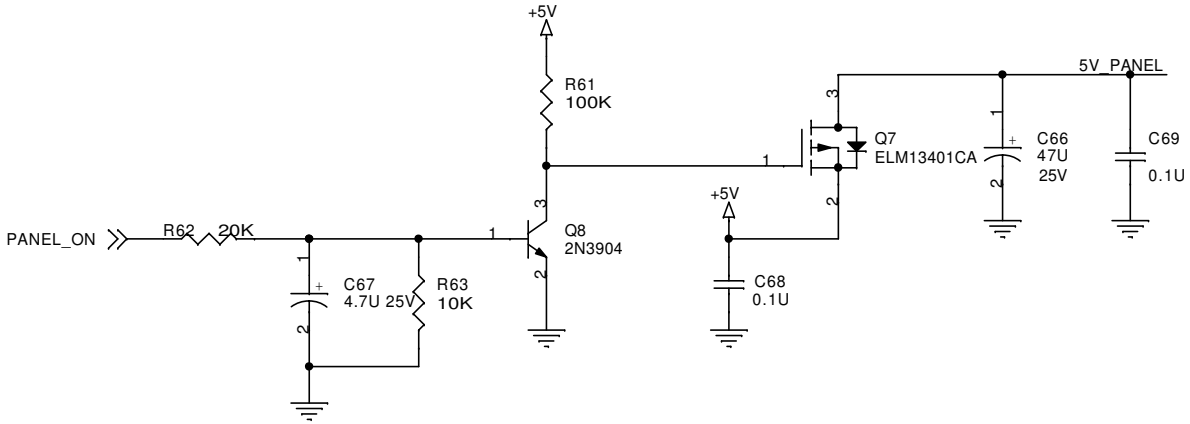
| Project Code | Model Name | OEM/ODM Model Name |
|---|---|---|
| 99.L1J72.001 | Q9T4 | <OEM/ODM> |

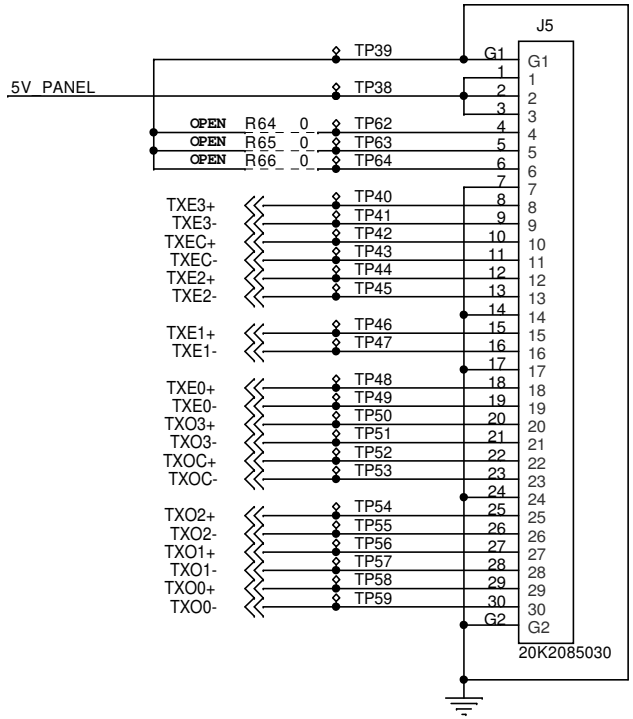
Title: INTERFACE BOARD

| Size | PCB P/N | PCB Rev. | Document Number | Rev. |
|---|---|---|---|---|
| <Size> | 48.L1J01.S03 | S03 | 99.L1J72.000-C3-304-001 | 1 |

Date: Saturday, February 05, 2005 Sheet 3 of 5

| Prepared By | Reviewed By | Approved By |
|---|---|---|
| ANGEL HU | JEFF CHI | ALLEN PC LEE |




# BenQ Corporation

| Project Code | Model Name | OEM/ODM Model Name |
|---|---|---|
| 99.L1J72.001 | Q9T4 | <OEM/ODM> |

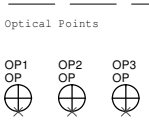
Title: INTERFACE BOARD

| Size | PCB P/N | PCB Rev. | Document Number | Rev. |
|---|---|---|---|---|
| <Size> | 48.L1J01.S03 | S03 | 99.L1J72.000-C3-304-001 | 1 |

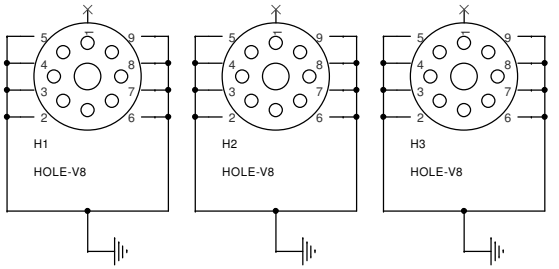
Date: Saturday, February 05, 2005 Sheet 4 of 5

| Prepared By | Reviewed By | Approved By |
|---|---|---|
| ANGEL HU | JEFF CHI | ALLEN PC LEE |

Optical Points




Screw Holes




# BenQ Corporation

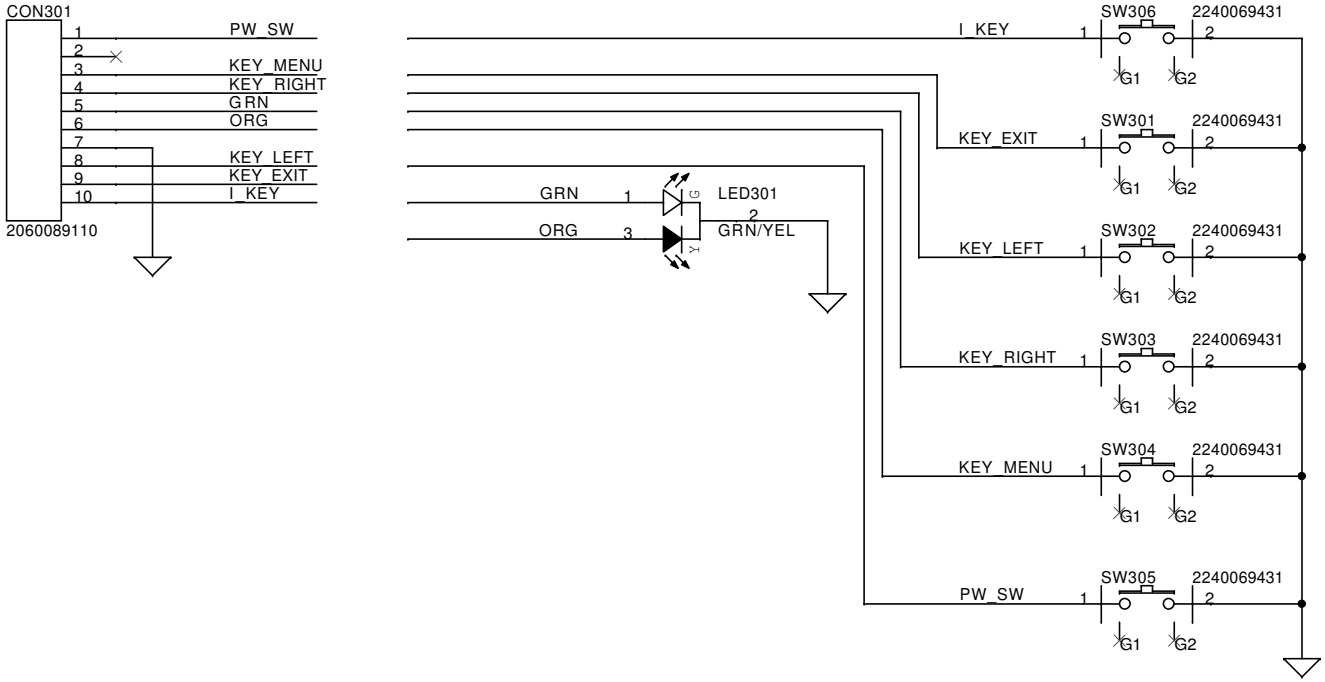
| Project Code | Model Name | OEM/ODM Model Name |
|---|---|---|
| 99.L1J72.001 | Q9T4 | <OEM/ODM> |

Title: INTERFACE BOARD

| Size | PCB P/N | PCB Rev. | Document Number | Rev. |
|---|---|---|---|---|
| <Size> | 48.L1J01.S03 | S03 | 99.L1J72.000-C3-304-001 | 1 |

Date: Saturday, February 05, 2005 Sheet 5 of 5

| Prepared By | Reviewed By | Approved By |
|---|---|---|
| ANGEL HU | JEFF CHI | ALLEN PC LEE |




LED use 06.3N5YG.14X;
Key use 22.40069.431

# BenQ Corporation

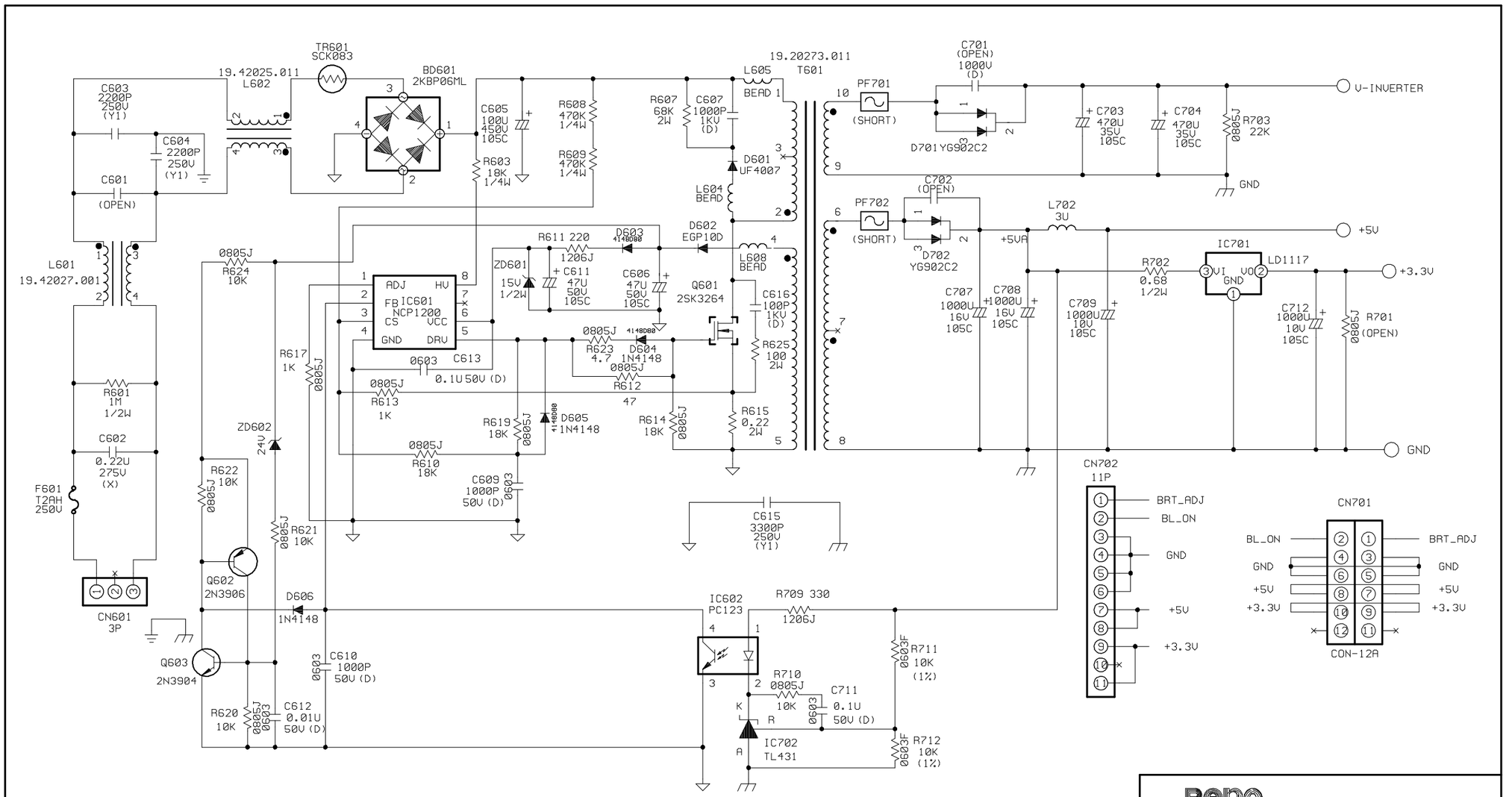
| Project Code | Model Name | OEM/ODM Model Name |
|---|---|---|
| 99.L1J72.001 | Q9T4 | <OEM/ODM> |

Title: CTRL BOARD

| Size | PCB P/N | PCB Rev. | Document Number | Rev. |
|---|---|---|---|---|
| <Size> | 48.L1J03.S01 | S01 | 99.L1J72.000-C2-204-003 | 0 |

Date: Friday, November 26, 2004 Sheet 1 of 1

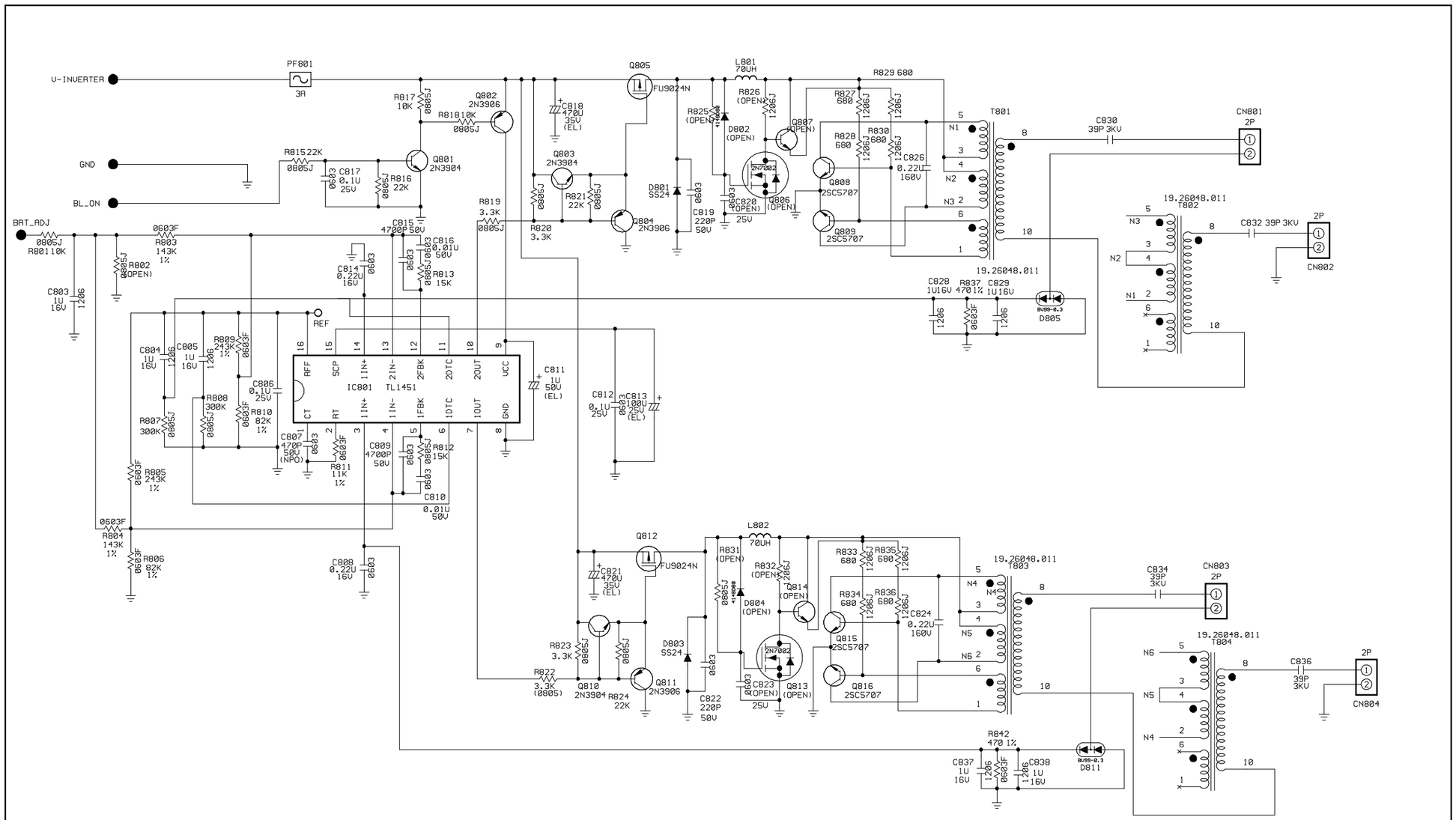
| Prepared By | Reviewed By | Approved By |
|---|---|---|
| ANGEL HU | JEFF CHI | DAVEN WU |




NOTES:
1. Resistor values are in ohm, K=1,000 ohm, M=1,000,000 ohm
2. All resistors are 1/8 watt, 5% except where otherwise indicated
3. ⏚ ⏚ ⏚ Represents PCB common ground.

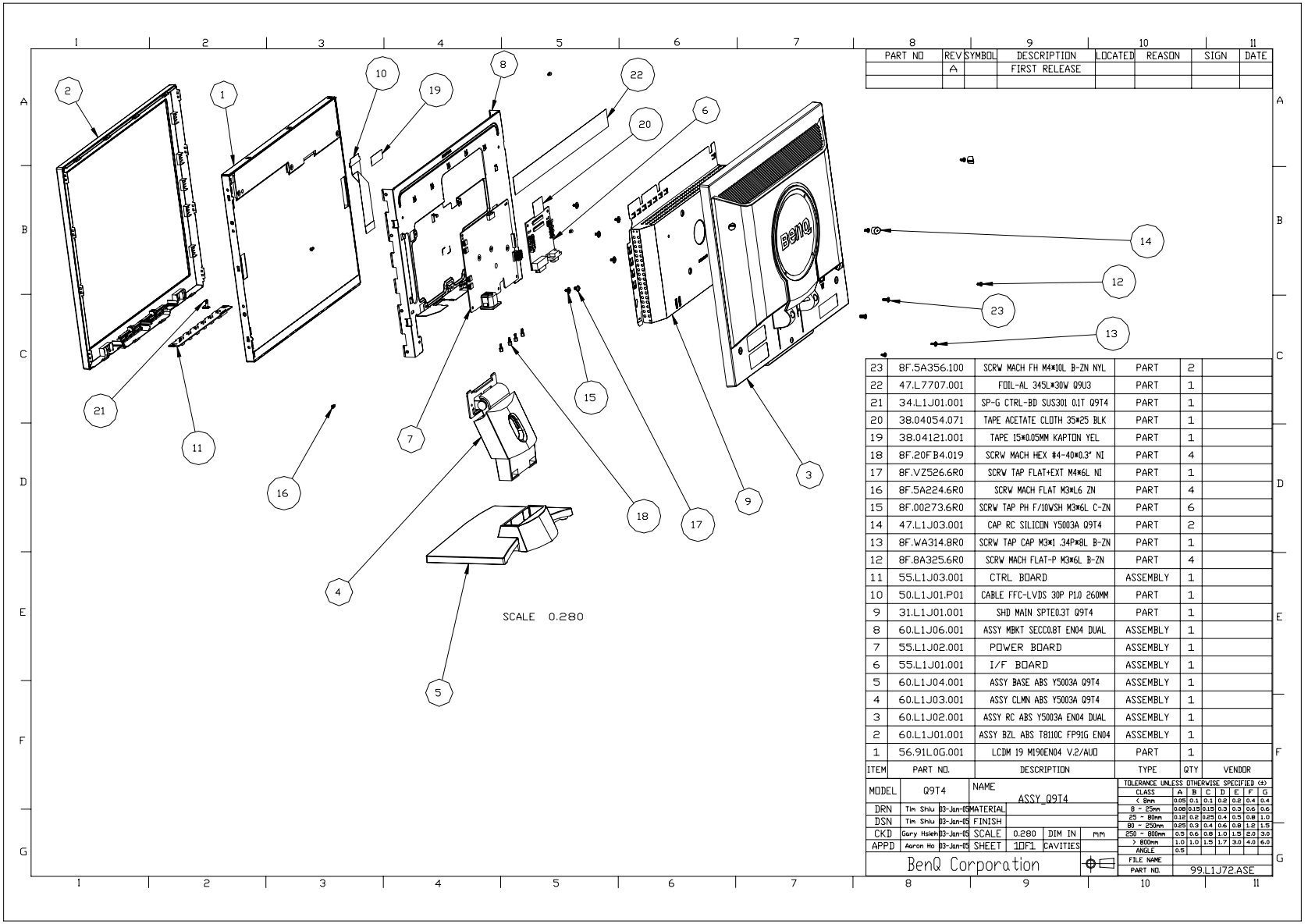
BenQ

| Q9T4 SPS BOARD SCHEMATICS | | | |
|---|---|---|---|
| SIZE A4 | L1J02S03.SCH | Project Code. 99.L1J72.001 | REV. 0 |
| DATE : 2/2/2005 | | Sheet 1 OF 2 | |
| Doc.No. 99.L1J72.000-C3-304-002 | | | |
| Prepared By | Reviewed By | Approved By | |
| ANGEL HU 2/2/2005 | GEORGE SHEU 2/2/2005 | H.J. WONG 2/2/2005 | |




NOTES:
1. Resistor values are in ohm, K=1,000 ohm, M=1,000,000 ohm
2. All resistors are 1/8 watt, 5% except where otherwise indicated
3. Represents PCB common ground.

| | | | |
|---|---|---|---|
| BenQ | | | |
| Q9T4 SPS BOARD SCHEMATICS | | | |
| SIZE A4 | L1J02S03.SCH | Project Code. 99.L1J72.001 | REV. 0 |
| DATE : 2/2/2005 | | Sheet 2 OF 2 | |
| Doc.No. 99.L1J72.000-C3-304-002 | | | |
| Prepared By | Reviewed By | Approved By | |
| ANGEL HU 2/2/2005 | GEORGE SHEU 2/2/2005 | H.J. WONG 2/2/2005 | |




| PART NO | REV | SYMBOL | DESCRIPTION | LOCATED | REASON | SIGN | DATE |
|---|---|---|---|---|---|---|---|
| | A | | FIRST RELEASE | | | | |

| ITEM | PART NO. | DESCRIPTION | TYPE | QTY | VENDOR |
|---|---|---|---|---|---|
| 23 | 8F.5A356.100 | SCRW MACH FH M4*10L B-ZN NYL | PART | 2 | |
| 22 | 47.L7707.001 | FOIL-AL 345L*30W Q9U3 | PART | 1 | |
| 21 | 34.L1J01.001 | SP-G CTRL-BD SUS301 0.1T Q9T4 | PART | 1 | |
| 20 | 38.04054.071 | TAPE ACETATE CLOTH 35*25 BLK | PART | 1 | |
| 19 | 38.04121.001 | TAPE 15*0.05MM KAPTON YEL | PART | 1 | |
| 18 | 8F.20FB4.019 | SCRW MACH HEX #4-40*0.3" NI | PART | 4 | |
| 17 | 8F.VZ526.6R0 | SCRW TAP FLAT+EXT M4*6L NI | PART | 1 | |
| 16 | 8F.5A224.6R0 | SCRW MACH FLAT M3*L6 ZN | PART | 4 | |
| 15 | 8F.00273.6R0 | SCRW TAP PH F/10WSH M3*6L C-ZN | PART | 6 | |
| 14 | 47.L1J03.001 | CAP RC SILICON Y5003A Q9T4 | PART | 2 | |
| 13 | 8F.WA314.8R0 | SCRW TAP CAP M3*1 .34P*8L B-ZN | PART | 1 | |
| 12 | 8F.8A325.6R0 | SCRW MACH FLAT-P M3*6L B-ZN | PART | 4 | |
| 11 | 55.L1J03.001 | CTRL BOARD | ASSEMBLY | 1 | |
| 10 | 50.L1J01.P01 | CABLE FFC-LVDS 30P P1.0 260MM | PART | 1 | |
| 9 | 31.L1J01.001 | SHD MAIN SPTE0.3T Q9T4 | PART | 1 | |
| 8 | 60.L1J06.001 | ASSY MBKT SECC0.8T EN04 DUAL | ASSEMBLY | 1 | |
| 7 | 55.L1J02.001 | POWER BOARD | ASSEMBLY | 1 | |
| 6 | 55.L1J01.001 | I/F BOARD | ASSEMBLY | 1 | |
| 5 | 60.L1J04.001 | ASSY BASE ABS Y5003A Q9T4 | ASSEMBLY | 1 | |
| 4 | 60.L1J03.001 | ASSY CLMN ABS Y5003A Q9T4 | ASSEMBLY | 1 | |
| 3 | 60.L1J02.001 | ASSY RC ABS Y5003A EN04 DUAL | ASSEMBLY | 1 | |
| 2 | 60.L1J01.001 | ASSY BZL ABS T8110C FP91G EN04 | ASSEMBLY | 1 | |
| 1 | 56.91L0G.001 | LCDM 19 M190EN04 V.2/AUO | PART | 1 | |

| | | | | | |
|---|---|---|---|---|---|
| MODEL | Q9T4 | NAME | ASSY_Q9T4 | | |
| DRN | Tim Shiu | 03-Jan-05 | MATERIAL | | |
| DSN | Tim Shiu | 03-Jan-05 | FINISH | | |
| CKD | Gary Hsieh | 03-Jan-05 | SCALE | 0.280 | DIM IN mm |
| APPD | Aaron Ho | 03-Jan-05 | SHEET | 1 OF 1 | CAVITIES |

BenQ Corporation

| TOLERANCE UNLESS OTHERWISE SPECIFIED (±) | | | | | | |
|---|---|---|---|---|---|---|
| CLASS | A | B | C | D | E | F | G |
| < 8mm | 0.05 | 0.1 | 0.1 | 0.2 | 0.2 | 0.4 | 0.4 |
| 8 ~ 25mm | 0.08 | 0.15 | 0.15 | 0.3 | 0.3 | 0.6 | 0.6 |
| 25 ~ 80mm | 0.12 | 0.2 | 0.25 | 0.4 | 0.5 | 0.8 | 1.0 |
| 80 ~ 250mm | 0.25 | 0.3 | 0.4 | 0.6 | 0.8 | 1.2 | 1.5 |
| 250 ~ 800mm | 0.5 | 0.6 | 0.8 | 1.0 | 1.5 | 2.0 | 3.0 |
| > 800mm | 1.0 | 1.0 | 1.5 | 1.7 | 3.0 | 4.0 | 6.0 |
| ANGLE | 0.5 | | | | | | |

| | |
|---|---|
| FILE NAME | |
| PART NO. | 99.L1J72.ASE |