

Table of Contents

1. Introduction	3
2. Operational Specification	4
2.1 Power supply	4
2.2 Signal interface	4
2.3 Video performance	5
2.4 Scan range	6
2.5 Plug & Play DDC2B Support	6
2.6 Support Timings	6
3. Operational & Functional Specification	7
3.1 Video performance	7
3.2 Brightness Adjustable Range	7
3.3 Acoustical Noise	7
3.4 Environment.....	7
3.5 Transportation	8
3.6 Electrostatic Discharge Requirements.....	8
3.7 EMC.....	8
3.8 Reliability	9
4. LCD Characteristics	9
4.1 The Physical definition & Technology summary of LCD panel	9
4.2 Optical characteristics of LCD panel	9
5. User Controls	10
5.1 User's hardware control definition.....	10
5.2 OSD control function definition.....	10
6. Mechanical Characteristics	11
6.1 Dimension	11
6.2 Weight	11
6.3 Plastic	11
6.4 Carton.....	12

7. Pallet & Shipment	12
7.1 Container Specification.....	12
7.2 Carton Specification.....	12
Product:	12
Package:	12
8. Certification	13
IEC60950	13
Appendix: Physical Dimension Front View and Side view	14

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.) 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/m² (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 ≤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

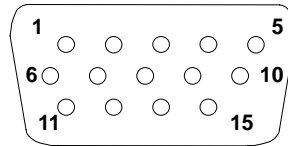
2.1 Power supply

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 ≤ 2 W, 240V	√		LED: Amber
Inrush Current	110 VAC 220 VAC	< 30 A (peak) < 60 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	1KV	√		
	IEC1000-4-5 (Surge)	Common: 2KV, 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 Length: 1500 +/- 50 mm	√		

2.2 Signal interface

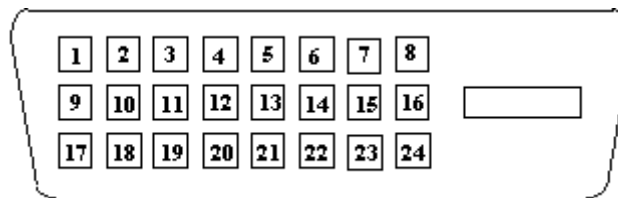
Item	Condition	Spec	OK	N.A	Remark
Signal Cable	15-pin D-Sub	Color: Black Length: 1500 +/- 30 mm	√		
	24-pin DVI-D	Color: Black Length: 2000 +/- 50 mm	√		
Pin assignment	15-pin D-sub connector	See Note-1	√		For 15-pin D-sub
	24-pin DVI-D connector	See Note-2	√		For 24-pin DVI-D
Video input	Signal type	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 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)	0.7 μs < H-SPW 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
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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/m ²	√		

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 °C	√		
	Non-operating	-20 ~ +60 °C	√		
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 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(g ² /Hz) 200Hz 0.0185(g ² /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	√		

3.6 Electrostatic Discharge Requirements

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

3.7 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	√		

	EN55022 class B	1dBuv for constant measure. Besides DNSF and VCCI class-2 are optional.			
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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 Reddish Normal User: Separate R/G/B adjustment	√		
OSD Position		OSD Horizontal position OSD Vertical position	√		
OSD Time		From 5 sec to 60 sec	√		
Language		8 languages	√		
Recall		Color recall Recall All	√		
Mode				√	
Input Select		D-sub 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 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 °C	√		
UV stability	ABS	Delta E < 8.0	√		
Resin		MPRII: ABS (VW55/VE0856/D350)	√		
Texture		MT-11020	√		Bezel texture MT-11010
Color		BCS-Y5003A	√		Bezel painting 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 3 rd 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		√	

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

Appendix: Physical Dimension Front View and Side view

Fig. 1 Physical Dimension Front View and Side view

