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## 1. Introduction

This specification describes Q9C4-Glare+OD, which is a 19.0" analog/digital interface color TFT LCD monitor with audio. The monitor supports up to 1280 x 1024 pixel resolution and refresh rate of 76 Hz. The independent 6 bits R, G, B colors are capable of displaying 262K colors (After scaler dithering 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 seller & module name	AUO M190EN04 V.1	
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	
Viewing Angle (@ Contrast Ratio = 10)	AUO 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	N.A.
Max resolution mode supported	1280 x 1024 @ 76Hz	
Number of Display Colors supported	262K colors	(RGB 6-bits data, after dithering 16.2M)
Contrast Ratio	AUO 450:1 (typ.)	Panel spec.
Luminance	400 cd/m <sup>2</sup> (typ.)	AUO 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	N.A.
DPMS supported	Yes	< 1 watts at 115V < 2 watts at 230V
LED indicator for power status showed	Yes	Blue/Amber/Non
OSD for control & information supported	Yes	
Multi-language supported for OSD	Yes	8 languages
Buttons control supported	Yes	7 buttons including 1 monitor power on/off control button.
Flywheel control supported	No	N.A.
Scaling function supported (fit full screen)	Yes	
Auto adjustment function supported	Yes	"i-key" function
DDC function supported (EDID ver. 1.3)	Yes	DDC2B only
Audio speakers supported	Yes	Speaker 2W/CH x 2
Audio Jack (input connector) supported	Yes	
Earphone Jack (input connector) supported	Yes	
Microphone function supported	No	N.A.
Mechanical Tilt base design	Yes	From -3 to +20 degree
VESA wall mounting design	Yes	
Mechanical Rotate design	No	N.A.
Mechanical Lift base design	No	N.A.
Kensington compatible lock design	Yes	

## 2. Operational Specification

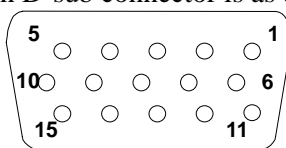
### 2.1 Power supply

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	≤ 50 W (w/o speaker) ≤ 60 W (w speaker)	√		LED: Blue
DPMS	DPMS “Off” state	≤ 1 W (AC 115V) ≤ 2 W (AC 230V)	√		LED: Amber
Inrush Current	110 VAC 220 VAC	< 30 A (peak) < 60 A (peak)	√		Cold-start
Earth Leakage Current	264 VAC/50Hz	< 3.5mA	√		
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	AUO 3mA ~7.5mA	√		Depends on the panel source.
CCFL Frequency	90 ~ 264VAC	40KHz ~ 80KHz	√		50k (typ.) Depends on the panel source.
Power cord		Color: Black Length: 1500 +/- 50 mm	√		

### 2.2 Signal interface

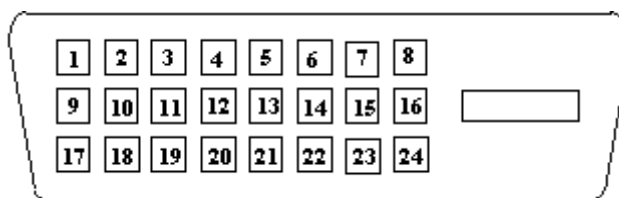
Item	Condition	Spec	OK	N.A	Remark
Signal Cable	15-pin D-Sub	Color: Black Length: 1500 +/- 30 mm	√		
	24-pin DVI-D	Color: Black Length: 2000 +/- 50 mm	√		
Pin assignment	15-pin D-sub connector	See Note-1	√		For 15-pin D-sub
	24-pin DVI-D connector	See Note-2	√		For 24-pin DVI-D
Video input	Signal type	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		< 7.4 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		30 ~ 82 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 Q9C4 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		AUO 450:1 (typ.)	√		Depends on the panel source
Brightness	AUO At CCFL 6.5mA & R/G/B saturated condition	AUO 400 cd/m <sup>2</sup> (typ.)	√		Depends on the panel source.
Response time	Rising + Falling time(on/off)	AUO 12 ms (typ.)	√		Depends on the panel source.
Viewing angle	At Contrast ratio = 10	AUO R/L: 70/70 degrees (typ.) and U/D: 70/65 degrees (typ.)	√		Depends on the panel source.
CIE coordinate of White		AUO 0.31, 0.33	√		Depends on the panel source.
Display colors		262K colors (RGB -6bits data, after dithering 16.2M )	√		Depends on the panel source.

#### 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 <sup>2</sup>	√		

#### 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 ~ 95%	√		Non-condensing
	Non-operating	10 ~ 95%	√		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 <sup>2</sup> /Hz 100 ~200 Hz, -6 dB/Oct. 200 Hz, 0.0038 g <sup>2</sup> /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 <sup>2</sup> /Hz) 200Hz 0.0185(g <sup>2</sup> /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 1dBuV for constant measure. Besides DNSF and VCCI class-2 are optional.	√		
	EN55022 class B				

### 3.8 Reliability

Item	Condition	Spec	OK	N.A	Remark
MTBF Prediction	Refer to MIL-217F	$\geq 60,000$ Hours	√		Excluding the CCFL
CCFL Life time	AUO At 25±5°C, 7mA	50,000 Hours (typ.)	√		See Note-4

**Note-4:** The assumed CCFL Life will be longer than 40,000 hours, typical value is 50,000 hours under stable condition at 25± 5°C; Standard current at 7.0 ± 0.5mA.

### 3.9 Audio performance

Item	Condition	Spec	OK	N.A	Remark
<b>Preamplifier + Power amp</b>					
(1)Output power		2 Wrms/CH @ 1KHz	√		
(2)THD (@ 2W)		<1%	√		
(3)S/N ratio		>40dB	√		
<b>Speaker Driver</b>					
(1)Nominal impedance		4ohm+/-15% at 1KHz	√		
(2) Rated/Max. input power		2 W/3W /CH	√		
(3)Frequency response		180~20KHz Average SPL-10dB	√		
(4)Output sound pressure level		84 ± 3 dB (1W 0.5M)	√		
(5)Dimension of box		100*34*16 mm3	√		
<b>Audio Control</b>					
(1)Volume range		0 ~100 levels	√		
(2)Mute		On/Off	√		
(3)SRS		On/Off	√		

## 4. LCD Characteristics

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

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

Item	Condition	Spec	OK	N.A	Remark
LCD Supplier		AUO	√		
Panel type of Supplier		M190EN04V.1	√		
Screen Diagonal		480mm(19.0")	√		
Display area	Unit=mm	376.320(H) x 301.056(V)	√		
Physical Size	Unit=mm	396.0(H) x 324.0(V) x 17.8 (D) (typ.)	√		
Weight	Unit=gram	2700 (typ.)	√		
Technology		TN type	√		
Pixel pitch	Unit=mm	0.294 x 0.294	√		
Pixel arrangement		R/G/B vertical stripe	√		
Display mode		Normally white	√		
Support color		262K colors (RGB 6-bits data)	√		

### 4.2 Optical characteristics of LCD panel

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

Item	Unit	Conditions	Min.	Typ.	Max.	Remark
Viewing Angle	[degree]	Horizontal (Right)	-	70	-	
	[degree]	CR = 10 (Left)	-	70	-	
	[degree]	Vertical (Up)	-	70	-	
	[degree]	CR = 10 (Down)	-	65	-	
Contrast ratio		Normal Direction	-	450	-	
Response Time	[msec]	Rising Time	-	3.6	-	
	[msec]	Falling Time	-	8.4	-	
	[msec]	Rising + Falling	-	12	-	
Color / Chromaticity Coordinates (CIE)		Red x	-	0.634	-	
		Red y	-	0.354	-	
		Green x	-	0.30	-	
		Green y	-	0.615	-	
		Blue x	-	0.138	-	
		Blue y	-	0.077	-	
Color Coordinates (CIE) White		White x	-	0.31	-	
		White y	-	0.33	-	
Luminance Uniformity	[%]	9 points measurement	-	70	75	
White Luminance @ CCFL 7mA (center)	[cd/m <sup>2</sup> ]			400	-	

\* The test methods for the above items' definition, please refer to the specification of AUO M190EN04 V.1.

## 5. User Controls

### 5.1 User's hardware control definition

Item	Condition	Spec	OK	N.A	Remark
Monitor Power button			√		
Enter button			√		

Right/Inc. button			√		
Left/Dec. button			√		
Exit /Volume button			√		
I-key button			√		
Mode button			√		

## 5.2 OSD control function definition

Item	Condition	Spec	OK	N.A	Remark
Brightness		0-100	√		
Contrast		0-100	√		
Horizontal Position		0-100	√		
Vertical Position		0-100	√		
Pixel Clock		0-100	√		
Phase		0-63	√		
Color Temperature		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		Mode recall Color recall Recall All	√		
Mode Selection		Standard/movie1/movie2/photo	√		
Input Source select		Dsub/DVI	√		
Sharpness		Sharp1 2 3 4 5 soft	√		
Display Information		For input timing	√		
Volume		0-100	√		
Mute		ON/OFF	√		
SRS		ON/OFF	√		
Hot key for Brightness		0-100	√		
Hot key for Contrast		0-100	√		
Hot key for Volume		0-100	√		
Hot key for Mode		Standard/movie1/movie2/photo	√		
Auto adjustment		Auto-Geometry	√		

\* 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		378.2x 302.9 mm	√		
Monitor without Stand	L x W x H mm	379.5*410.8*66.8mm	√		

Monitor with Stand	L x W x H mm	<b>419.3*410.8*215.4 mm</b>	√		
Carton Box (outside)	L x W x H mm	<b>570*495*256mm</b>	√		
Tilt and Swivel range		Tilt: -3 ~ +20 degree Swivel: 0 degrees	√		

## 6.2 Weight

Item	Condition	Spec	OK	N.A	Remark
Monitor (Net)		<b>6 Kg</b>	√		
Monitor with packing (Gross)		<b>7.2 Kg</b>	√		

## 6.3 Plastic

Item	Condition	Spec	OK	N.A	Remark
Flammability		<b>94-HB</b>	√		
Heat deflection To	<b>ABS</b>	65 °C	√		
UV stability	<b>ABS</b>	<b>Delta E &lt; 8.0</b>	√		
Resin		MPRII: ABS (VW55/VE0856/D350)	√		
Texture		<b>MT-11020</b>	√		Bezel texture MT-11000
Color		<b>Y5003A</b>	√		Bezel painting T8020C

## 6.4 Carton

Item	Condition	Spec	OK	N.A	Remark
Color		Kraft	√		
Material		C Flute	√		
Compression strength		252 KGF	√		
Burst Strength		16 KGF/cm <sup>2</sup>	√		
Stacked quantity		8 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'	<b>320</b>	<b>Pallet A: 32</b>	<b>Pallet A: 10</b>
			<b>X</b>	<b>X</b>
	40'	<b>768</b>	<b>Pallet A: 32</b>	<b>Pallet A: 24</b>
			<b>X</b>	<b>X</b>

Without pallet	20'	<b>352</b>	X	X
			X	X
	40'	<b>768</b>	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)
<b>6Kg</b>	<b>8.5Kg</b>	<b>379.5*410.8*66.8</b>	<b>419.3*410.8*215.4</b>

**Package:**

Carton Interior Dimension (mm) L*W*H	Carton External Dimension (mm) L*W*H
<b>485*560*238</b>	<b>495*570*256</b>

## 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 <sup>rd</sup> 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

