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Specification of FUJITSU TFT-LCD module

NA19026-C081

Approval

Date:

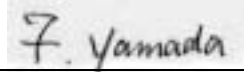
By :

This Product is designed, developed and manufactured as contemplated for general use, including without limitation, general office use, personal use, household use, and ordinary industrial use, but is not designed, developed and manufactured as contemplated for use accompanying fatal risks or dangers that, unless extremely high safety is secured, could lead directly to death, personal injury, severe physical damage or other loss (hereinafter "High Safety Required Use"), including without limitation, nuclear reaction control in nuclear facility, aircraft flight control, air traffic control, mass transport control, medical life support system, missile launch control in weapon system. If customer's product possibly falls under the category of High Safety Required Use, please consult with our sales representatives in charge before such use. In addition, FDTC shall not be liable to the customer and/or any third party for any claims or damages arising in connection with the High Safety Required Use of the Product without permission.

Specification No. : Tech Bes LCD-00223

Issue Date : Oct. 15, 2003

Issued by :



F. Yamada

Director

Design Dept.

LCD Products Div.

FUJITSU DISPLAY TECHNOLOGIES CORPORATION

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DESIG.	20030926	Sekido	CHECK	Takahashi	APPR.	Yamada		

1. APPLICATIONS

This specification is applied to the 17.0 in. XGA-WIDE supported TFT-LCD module.

2. PRODUCT NAME AND MODEL NAME

2-1. Product Name : LCD Module

2-2. Model Name : NA19026-C081

3. OVERVIEW

This LCD module has a TFT active matrix type liquid crystal panel 1280×768 pixels, and diagonal size of 43cm (17.0-inch). This module supports 1280×768 XGA-WIDE mode (Non-interlace).

This LCD has a XGA-WIDE-capable 1ch-LVDS interface and can display 16 million colors. By timing control signal, images are displayed on the screen at given value under specified timing.

Control signals to this LCD module are ENAB (Data enable signal), DCLK signal and RGB data signal. Data signal is transmitted with single port. (8 bit for each R, G, B)

The power supply of this LCD module is +5V DC.

4. CONFIGURATION

This LCD module consists of a color TFT-LCD panel that mounted with TFT driver ICs, a cold-cathode fluorescent tube back-light, a LVDS interface PCB, a structure and a bezel. And these components are integrated in a LCD module.

Cold-cathode fluorescent tube and lamp holder are replaceable.

Fig.4-1 shows a block diagram of this LCD module.

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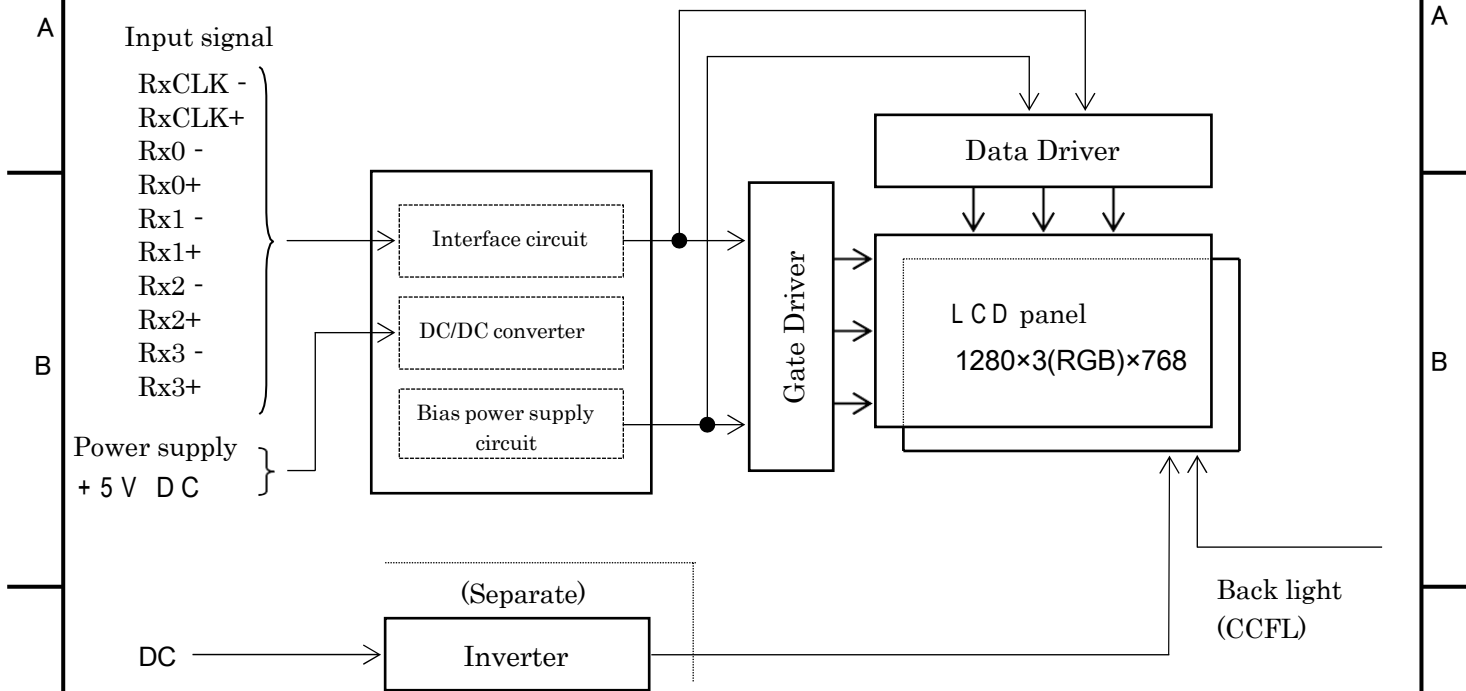


Figure 4-1. Block Diagram

5. MECHANICAL SPECIFICATIONS

Table 5-1 shows the mechanical specifications of this LCD module.

Table 5-1. Mechanical Specifications

Item	Specifications	Unit	Remark
Dimensions	413.8×263.5×18.4(TYP.)	mm	Edge type backlight is used. (φ2.6 CCFL×4) Outward Appearance is shown at page 32 and 33.
Display Resolution	(1280×3) ×768	—	
Display Dot Area	369.6×221.76	mm	
Dot Pitch	(0.09625×3) ×0.28875	mm	
Aspect Ratio	1 : 1	—	
Weight	2,000 max	g	
FG-SG	Short circuit	—	

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6. ABSOLUTE MAXIMUM RATINGS

Table 6-1 shows the absolute maximum rating of this LCD module.

Table 6-1. Absolute Maximum Ratings

Item	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage	V _{CC}	-0.3	—	6.0	V
Input Voltage	V _{IN}	-0.3	—	V _{CC} +0.3	V

7. RECOMMENDED OPERATING CONDITIONS

Table 7-1 shows the recommended operating conditions of this LCD module.

Table 7-1. Recommended Operating Conditions

Item	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage	V _{CC}	4.75	5.0	5.25	V
Ripple Voltage (V _{CC})	V _{RP}	—	—	100	mVp-p

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8. ELECTRICAL SPECIFICATIONS

Table 8-1 shows the electrical specifications of this LCD module.

Table 8-1. Electrical Specifications

Item	Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remark
Supply Current	I _{CC}	V _{CC} =+5.0±0.25V V _{SS} =0V	—	680	900	mA	*1
“H” Level Logic Input Voltage	V _{IH}	DCLK=32.498MHz	0.7 × V _{CC}	—	V _{CC} +0.3	V	*2
“L” Level Logic Input Voltage	V _{IL}		GND	—	0.3 × V _{CC}	V	*2
BACK LIGHT CCFL Turn on Voltage	V _S	f _L =50kHz, T _a =25°C	—	1230	1600	V _{rms}	
		f _L =50kHz, T _a =0°C	—	—	1600		
Lighting Voltage	V _L	f _L =50kHz I _L =10.5mA	590	630	670	V _{rms}	*4
Lighting Frequency	f _L	V _L =630V _{rms}	40	50	60	kHz	
*3 Tube Current	I _L	f _L =50kHz V _L =630V _{rms}	9.5	10.5	11.0	mArms	*4

(*1) Typical current value is measured when gray scale (vertical 256 levels) is displayed at V_{CC}=5.0V.

Maximum current value is measured when stripes with respect to each RGB dot are displayed at V_{CC}=5.0V.
Without rush current.

(*2) Timing control circuit input voltage

(*3) Backlight specifications are valid when using a suitable inverter such as the “FLCV-15” of FDTC.

(*4) Tube current (I_L) shows the value of the current and voltage that is consumed at one lamp. (4 tubes/unit)

This LCD module has 4 lamps. Each 2 lamps are placed at upper and lower side of the display.

2 lamps are connected in parallel. Each low voltage terminals (GND side) are bound into 1 line cable.

(See 11-1. Pin configuration for backlight)

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Note 1) Measurement Circuit

Based on Fig.8-1.

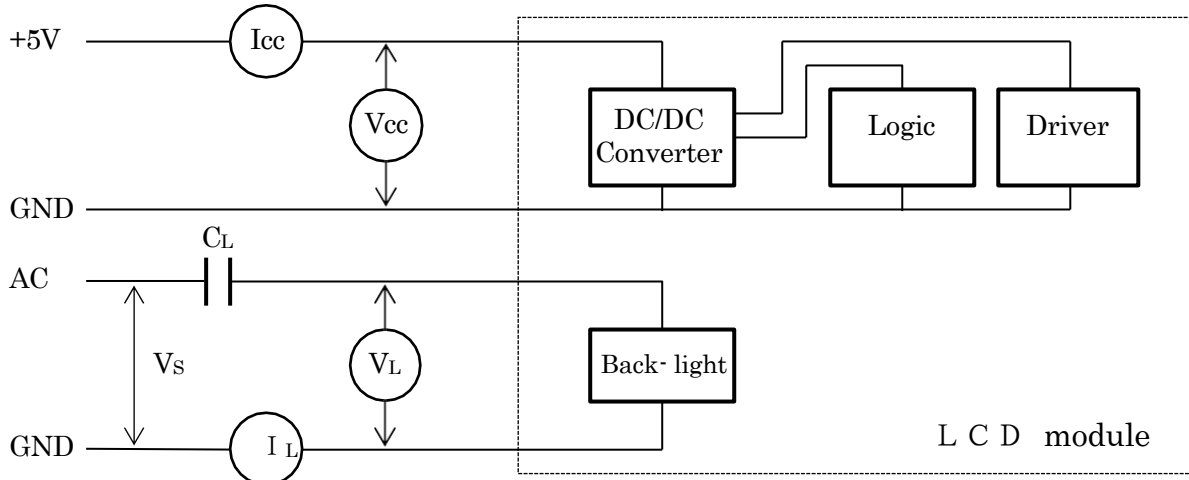


Fig.8-1. Measurement Circuit

Note 2) Equivalent Circuit

Based on Fig.8-2 (a), (b).

Input signals(LVDS-1ch)

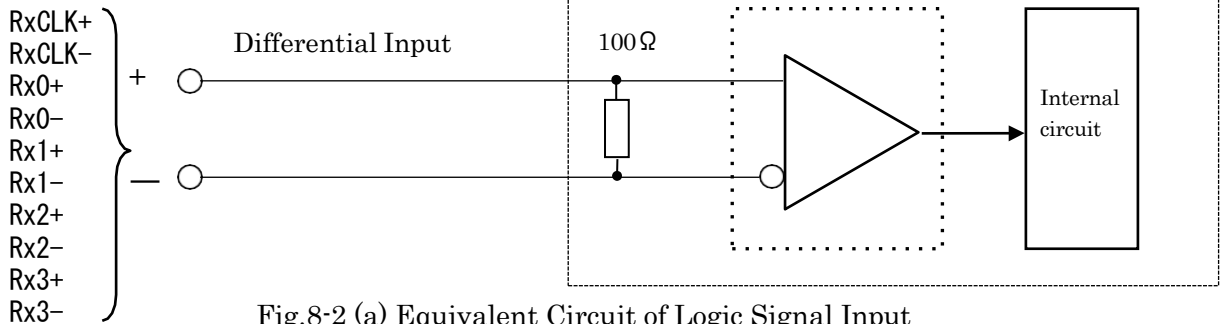
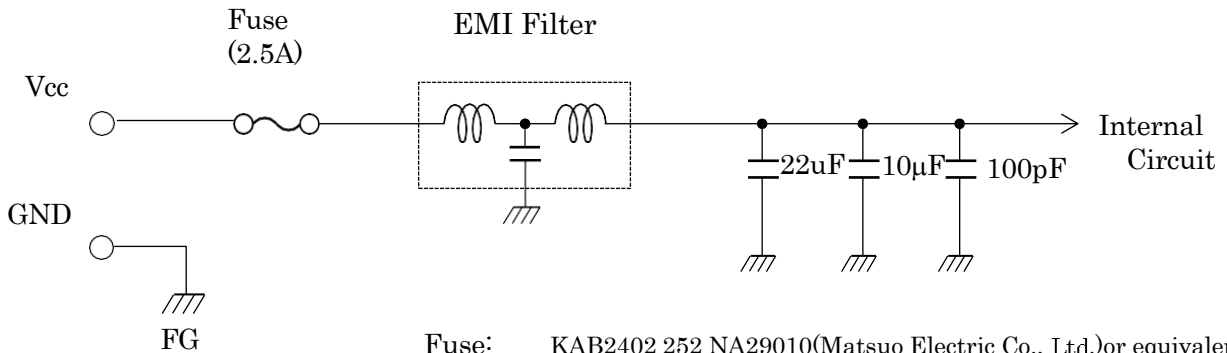


Fig.8-2 (a) Equivalent Circuit of Logic Signal Input



Fuse: KAB2402 252 NA29010(Matsuo Electric Co., Ltd.)or equivalent.
EMI Filter: SGM20C1E332-2A(SUMITOMO Metal)or equivalent.

Fig.8-2 (b) Equivalent Circuit of Power Supply

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9. OPTICAL SPECIFICATIONS

Table 9-1 shows the optical specifications of this LCD module.

Table 9-1. Optical Specifications

Ta=25°C

Item	Symbol	Condition	Specifications			Unit	Remark			
			MIN.	TYP.	MAX.		Note			
Visual Angle	Horizontal	$\theta_{L,R}$	CR \geq 10	$\theta_{U,D}=0^\circ$	85	—	—	deg	(1)(2)	
	Vertical	$\theta_{U,D}$		$\theta_{L,R}=0^\circ$	85	—	—	deg	(3)(5) (6)	
Contrast Ratio	CR	$\theta_{L,R,U,D}=0^\circ$		350	600	—	—	White/Black	(1)(2) (3)(5)	
Response Time(ON) (B→W)	t_{on}	$\theta_{L,R,U,D}=0^\circ$	Ta=25°C	—	15	30	ms		(1) (4) (5)	
			Ta=0°C	—	50	100	ms			
Response Time(OFF) (W→B)	t_{off}	$\theta_{L,R,U,D}=0^\circ$	Ta=25°C	—	10	25	ms			
			Ta=0°C	—	50	100	ms			
Brightness	I	$\theta_{L,R,U,D}=0^\circ$ V _{CC} =5V, I _L =10.5mA (at maximum brightness)		350	450	—	cd/m ²	White*1	(1)(5)	
Brightness Uniformity	ΔI			75	—	—	%		(1)(5) (7)	
Chromaticity	W		X		0.283	0.313	0.343	—		(1) (5)
			Y		0.299	0.329	0.359	—		
	R		(x, y)	Red	0.65, 0.34 Typ.					
	G			Green	0.30, 0.59 Typ.					
B	Blue	0.15, 0.14 Typ.								
γ -curve	γ			2.4 Typ.						
LCD Panel Type				TFT Color						
Display Mode				Normally Black VA						
Wide Viewing Angle Technology				MVA-Premium						
Optimum Viewing Angle				— (symmetry)				(6)		
Display Color				16 million (each 6-bit+2-bit FRC)						
Color of non-display area				Black						
Surface Treatment				—						

(*1) Specified value is measured in 20~30 minutes after lighting on (LCD module single).
 A required value may not be achieved on condition that LCD module is built in the cabinet because of its radiation.
 All items without “Brightness Uniformity” are measured at the center of display board.

(Note1) •CS-1000 (MINOLTA Co., Ltd.) , BM-5A(Topcon) or equivalent luminance colorimeter should be used for the measurement.
 Field=2°, L=500mm
 •The specified value of viewing angle, contrast, brightness, brightness uniformity and chromaticity are under the dark room condition (1lux or less).

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Note 1) Definition of Viewing Angle (1)

Based on Fig.9-2.

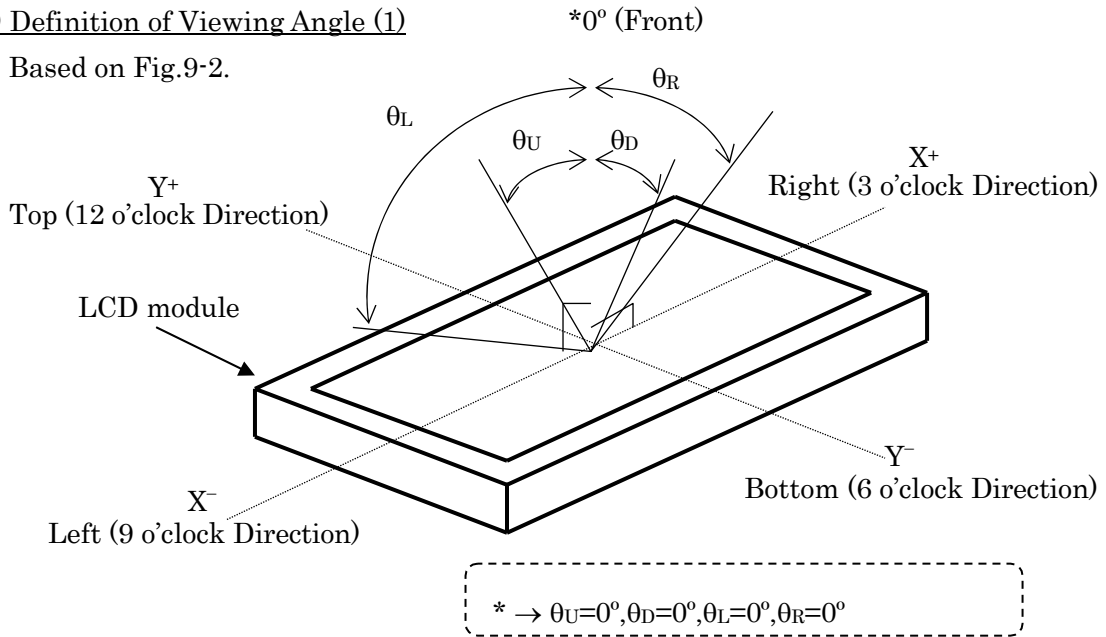


Fig.9-2. Definition of Viewing Angle (1)

Note 2) Definition of Viewing Angle (2)

Based on Fig.9-3.

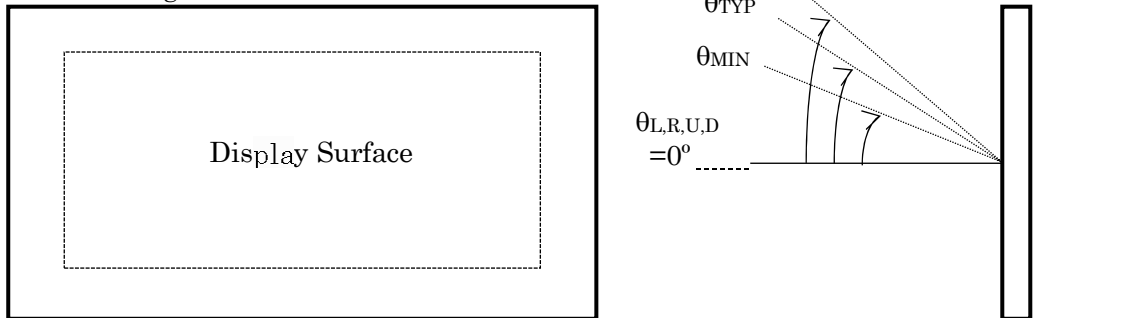


Fig.9-3. Definition of Viewing Angle (2)

Note 3) Definition of Contrast Ratio (CR)

Determined by Formula (1) based on Fig.9-4. Voltage-Brightness Characteristics.

$$= \frac{L_W \text{ (Brightness at white)}}{L_B \text{ (Brightness at black)}} \quad \text{----- (1)}$$

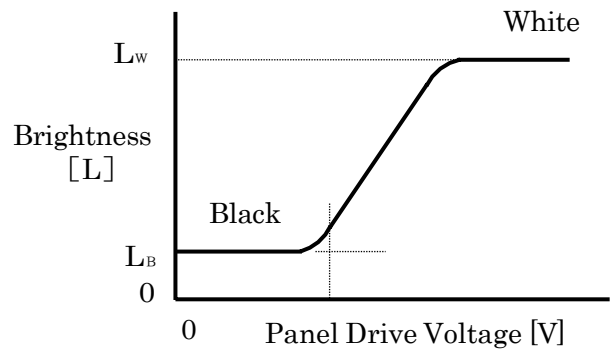


Fig.9-4. Voltage-Brightness Characteristics

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Note 4) Definition of Response Time

Based on Fig.9-5.

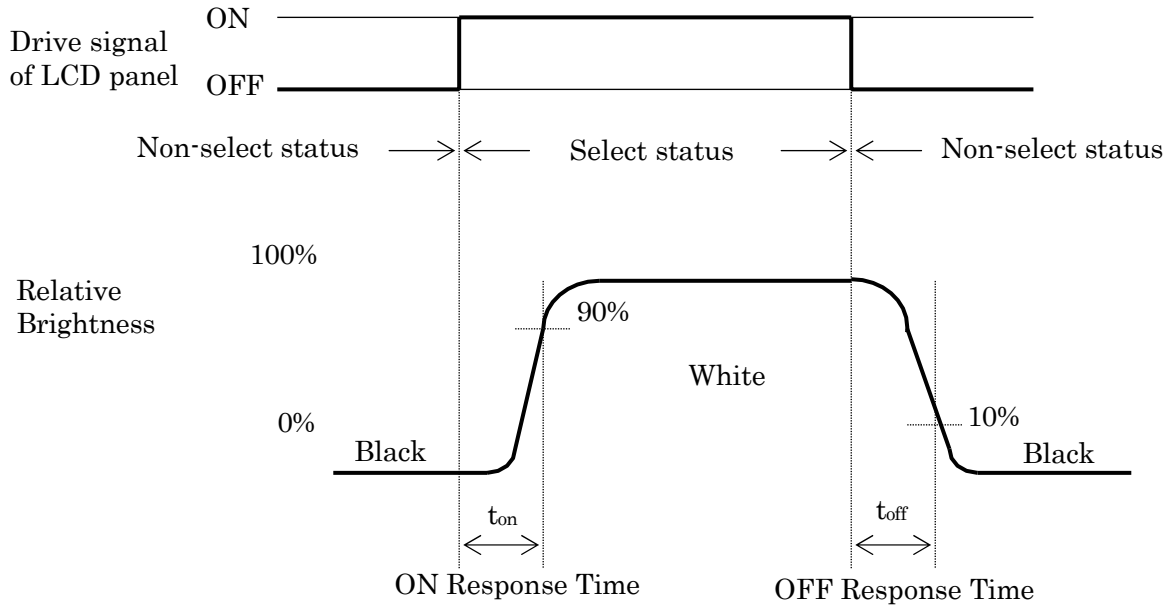


Fig.9-5. Definition of Response Time

Note 5) Contrast Ratio and Response Measurement System

Based on Fig.9-6.

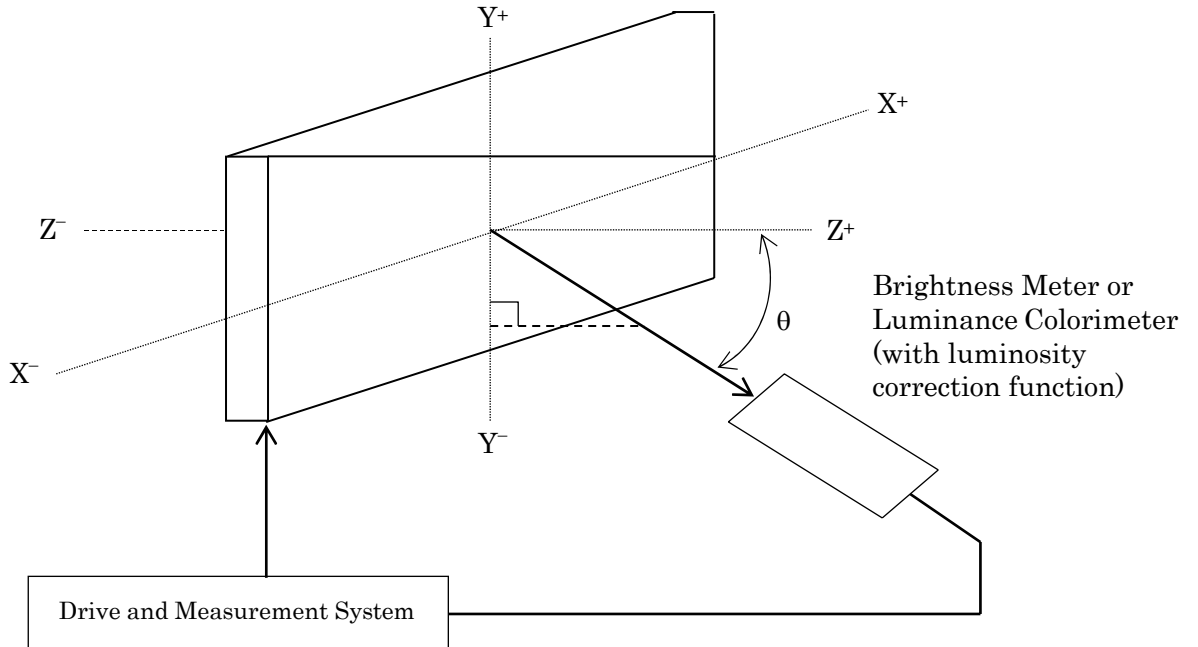


Fig.9-6. Contrast Ratio and Response Time Measurement System

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