



DCE156FH1-Q42-300
Preliminary Product Specification
Rev.V2

SPEC. NUMBER

PRODUCT GROUP
TFT-LCD

Rev.
V2

ISSUE DATE
2025.09.18

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1.0 GENERAL DESCRIPTION

1.1 Introduction

DCE156FH1-Q42-300 V2 is a color active matrix TFT LCD module using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This module has a 15.6 inch diagonally measured active area with Full-HD resolutions (1920 horizontal by 1080 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 16.2M(6+2bit) colors and color gamut 45%. The TFT-LCD panel used for this module is a low reflection and higher color type. Therefore, this module is suitable for Notebook PC. The LED driver for back-light driving is built in this model. All input signals are eDP1 2 interface compatible.

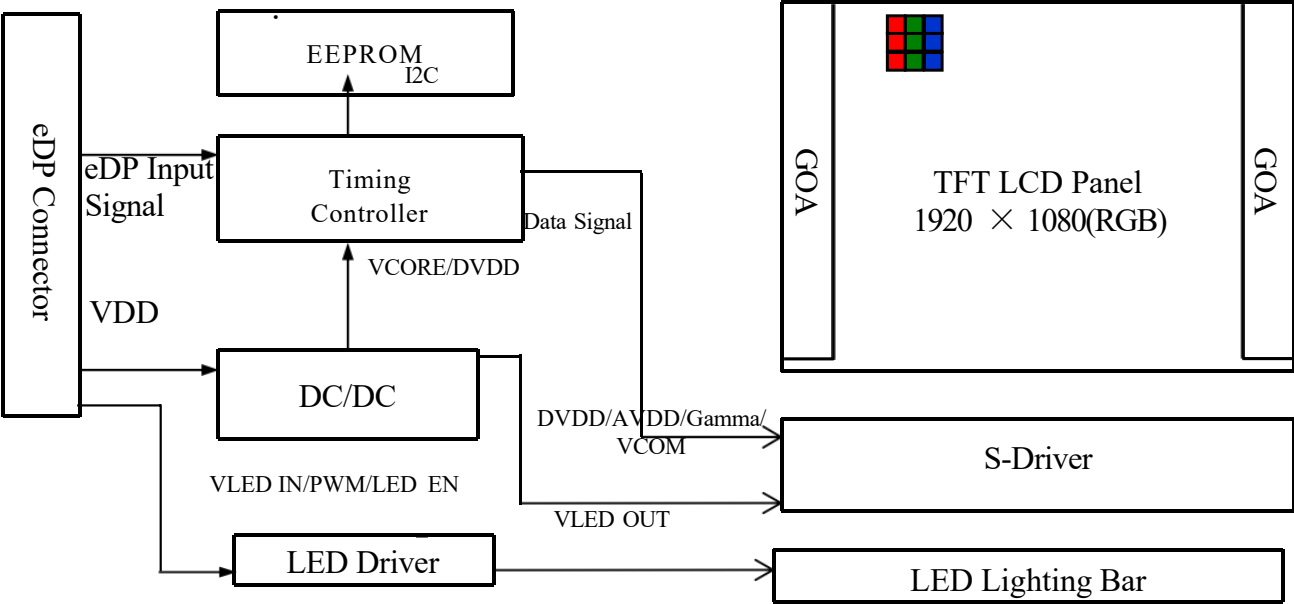


Figure 1. Drive Architecture

1.2 Features

- 2 lane eDP interface with 2.7Gbps link rates
- 16.2M(6+2bit) color depth, color gamut 45%
- Single LED lighting bar (Bottom side/Horizontal Direction)
- Data enable signal mode
- Green product (RoHS & Halogen free product)
- On board LED driving circuit
- Low driving voltage and low power consumption
- Onboard EDID chip
- DPCD Version 1.1

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1.3 Application

- Notebook PC (Wide type)

1.4 General Specification

The followings are general specifications at the model DCE156FH1-Q42-300 V2. (listed in Table 1)
<Table 1. General Specifications>

Parameter	Specification	Unit	Remarks
Active area	344.16(H) × 193.59(V)	mm	
Number of pixels	1920 (H) × 1080 (V)	pixels	
Pixel pitch	179.25(H) × 179.25(V)	um	
Pixel arrangement	RGB Vertical stripe		
Display colors	16.2M(6+2bit)		
Color gamut	Typ45%, Min42%		CIE1931
Display mode	Normally Black		
Dimensional outline	350.68 ± 0.3(H)*205.19 ± 0.3(V)(W/O PCB)*2.7 ± 0.2 350.68 ± 0.3(H)*205.19 ± 0.3(V) (W/PCB)*4.8Max.	mm	
Weight	425(max)	g	
Surface treatment	Anti-Glare		
Surface hardness	3H		
Back-light	Bottom edge side, 1-LED lighting bar type		Note 1
Power consumption	P _D : 0.7(Max)	W	@Mosaic
	P _{BL} : 3.3(Max)	W	
	P _{Total} : 4.3 (Max)	W	@Mosaic

Notes : 1. LED Lighting Bar (55*LED Array)

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A4(210 X 297)

2.0 ABSOLUTE MAXIMUM RATINGS

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table 2.

< Table 2. Absolute Maximum Ratings >

Ta=25+/-2°C

Parameter	Symbol	Min.	Max.	Unit	Remarks
Power Supply Voltage	V _{DD}	-0.3	4.0	V	Note 1
eDP input Voltage	V _{eDP}	0	2.0	V	
Logic Supply Voltage	V _{IN}	V _{SS} -0.3	V _{DD} +0.3	V	
Operating Temperature	T _{OP}	0	+50	°C	Note 2
Storage Temperature	T _{ST}	-20	+60	°C	

Notes :

1. Permanent damage to the device may occur if maximum values are exceeded functional operation should be restricted to the condition described under normal operating conditions.

2. Temperature and relative humidity range are shown in the figure below.

95 % RH Max. (40 °C ≥ Ta) Maximum wet - bulb temperature at 39 °C or less. (Ta > 40 °C) No condensation.

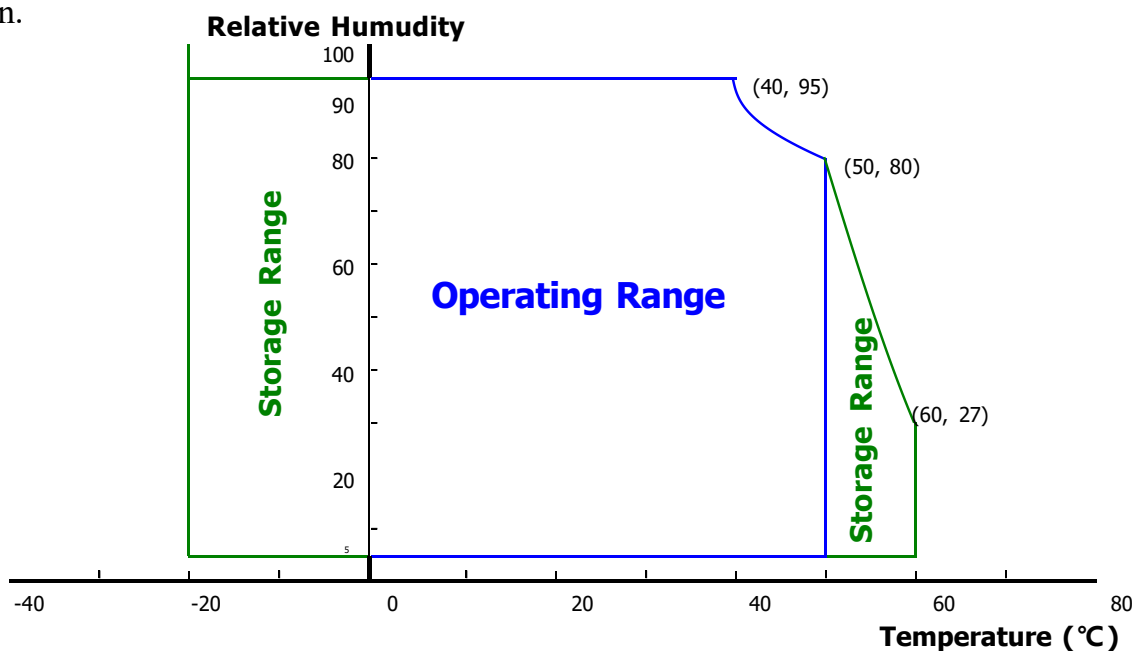


Figure 2. Temperature and Relative Humidity Range

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3.0 ELECTRICAL SPECIFICATIONS

3.1 Electrical Specifications

Notes :

- The supply voltage is measured and specified at the interface connector of LCM.
The current draw and power consumption specified is for 3.3V at 25 °C.
 - Mosaic pattern 8*8
 - R/G/B patterns

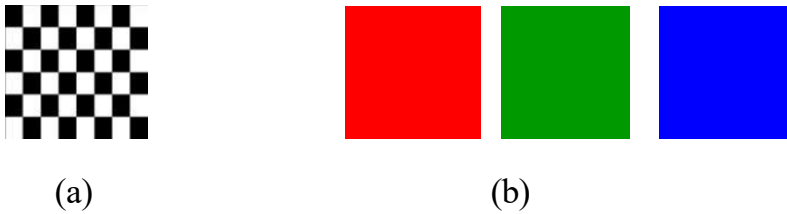


Figure 3. Power Measure Patterns

- Calculated value for reference ($V_{LED} \times I_{LED}$)
- Measure condition (Figure 4)

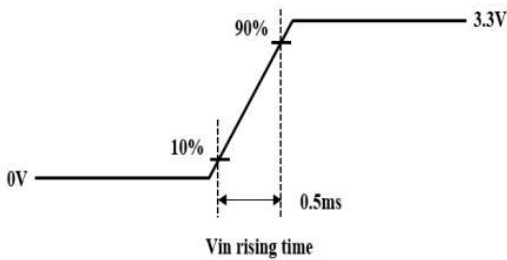


Figure 4. Inrush Measure Condition

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3.2 Backlight Unit

< Table 4. LED Driving Guideline Specifications > Ta=25+/-2°C

Parameter		Min.	Typ.	Max.	Unit	Remarks	
LED Forward Voltage		V _F	-	-	2.9	V	
LED Forward Current		I _F	-	17.5	-	mA	
LED Power Input Voltage		V _{LED}	5	12	21	V	
LED Power Input Current		I _{LED}	-	-	275	mA	Note 1
LED Power Consumption		P _{LED}	-	-	3.3	W	
Power Supply Voltage for LED Driver Inrush		I _{led} inrush	-	-	1.5	A	Note 3
LED Life-Time		N/A	15,000	-	-	Hour	I _F = 17.5mA
EN Control Level	Backlight On	V _{BL_EN}	2.5	-	5.0	V	
	Backlight Off		0	-	0.5	V	
PWM Control Level	High Level	V _{BL_PWM}	2.5	-	5.0	V	
	Low Level		0	-	0.5	V	
PWM Control Frequency		F _{PWM}	200	-	2,000	Hz	
Duty Ratio			5	-	100	%	

Notes :

- Power supply voltage12V for LED driver.
Calculator value for reference IF × VF ×55/driver efficiency = PLED
- The LED life-time define as the estimated time to 50% degradation of initial luminous.
- Measure condition (Figure 5)

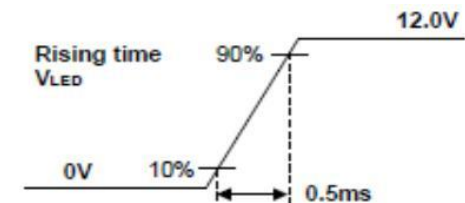
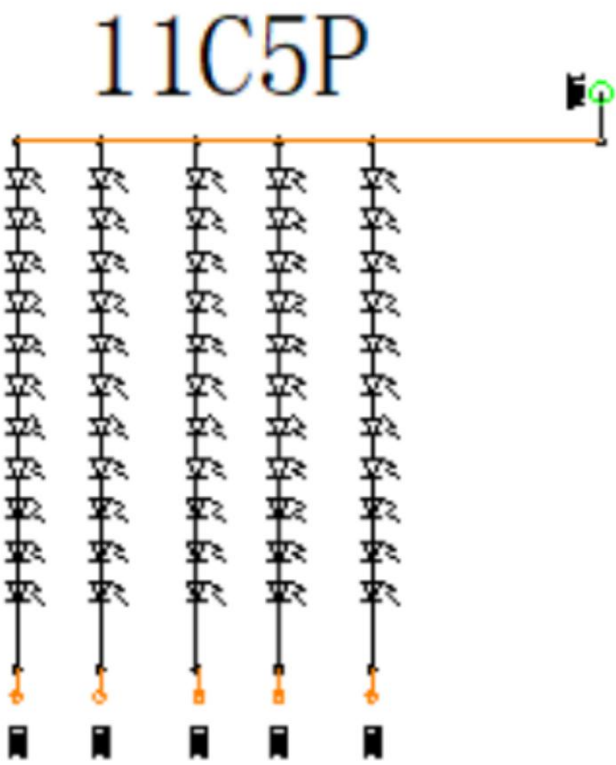


Figure 5. Inrush Measure Condition

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3.3 LED Structure



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4.0 OPTICAL SPECIFICATION

4.1 Overview

The test of optical specifications shall be measured in a darkroom (ambient luminance ≤ 1 lux and temperature = $25 \pm 2^\circ\text{C}$) with the equipment of luminance meter system (PR730&PR810) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0° . We refer to $\theta=0$ ($=\theta_3$) as the 3 o'clock direction (the "right"), $\theta=90$ ($=\theta_{12}$) as the 12 o'clock direction ("upward"), $\theta=180$ ($=\theta_9$) as the 9 o'clock direction ("left") and $\theta=270$ ($=\theta_6$) as the 6 o'clock direction ("bottom"). While scanning θ and/or Φ , the center of the measuring spot on the display surface shall stay fixed. The backlight should be operating for 30 minutes prior to measurement. VDD shall be $3.3 \pm 0.3\text{V}$ at 25°C .

4.2 Optical Specifications

<Table 5. Optical Specifications>

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle Range	Horizontal	Θ_3	CR > 10	80	85	-	Deg.	Note 1
		Θ_9		80	85	-	Deg.	
	Vertical	Θ_{12}		80	85	-	Deg.	
		Θ_6		80	85	-	Deg.	
Luminance Contrast Ratio		CR	$\Theta = 0_{\circ}$	800	1000	max		Note 2
Luminance of White		Y _w	Center	250	300		cd/m²	
White Luminance Uniformity		ΔY_9	9 Points	75	80		%	Note 4
White Chromaticity		W _x	$\Theta = 0_{\circ}$	0.270	0.300	0.330		Note 3
		W _y		0.290	0.320	0.350		
Reproduction of Color	Red	R _x	$\Theta = 0_{\circ}$	Typ.-0.03	0.599	Typ.+0.03		
		R _y			0.359			
	Green	G _x			0.346			
		G _y			0.545			
	Blue	B _x			0.143			
		B _y			0.117			
Color Gamut				42	45	-	%	CIE1931
Response Time (Rising + Falling)		T _{RT}	Ta= 25°C $\Theta = 0_{\circ}$	-	25	35	ms	Note 6
Cross Talk		CT	$\Theta = 0_{\circ}$	-	-	2.0	%	Note 7
Gamma		-	-	1.9	2.2	2.5	-	



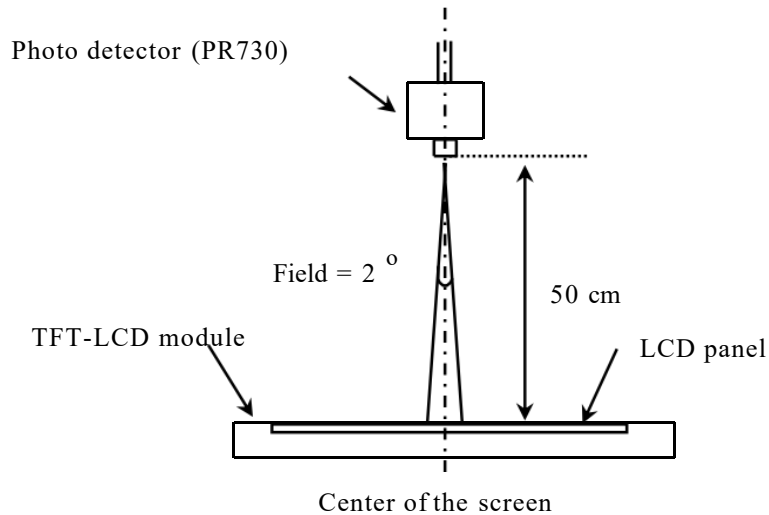
Notes :

1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface (see Figure 7).
2. Contrast measurements shall be made at viewing angle of $\Theta = 0$ and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state. (see Figure 7) Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3. Center Luminance of white is defined as luminance values of 5 point average across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in Figure 8 for a total of the measurements per display.
4. The White luminance uniformity on LCD surface is then expressed as : $\Delta Y = \text{Minimum Luminance of 5(or 13) points} / \text{Maximum Luminance of 5(or 13) points}$. (see Figure 8 and Figure 9).
5. The color chromaticity coordinates specified in Table 5 shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.
6. The electro-optical response time measurements shall be made as Figure 10 by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is T_r , and 90% to 10% is T_f .
7. Cross-Talk of one area of the LCD surface by another shall be measured by comparing the luminance (YA) of a 10 ± 1 mm diameter area, with all display pixels set to gray 127 (of 0 to 255), to the luminance (YB) of that same area when any adjacent area is driven dark. The luminance ratio shall not exceed 1:1.05 (See Figure 11).

4.3 Optical Measurements



Optical characteristics measurement setup

Figure 7. Measurement SetUp

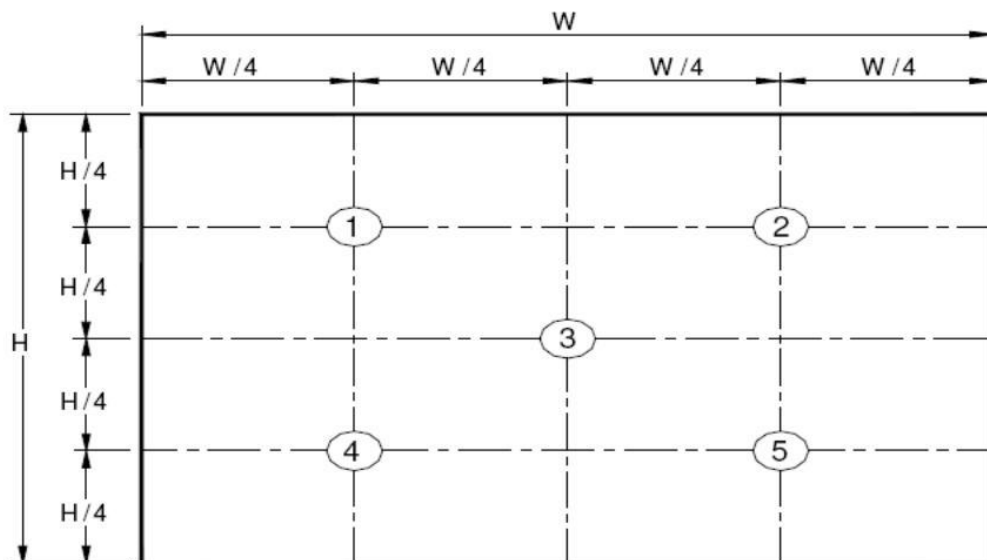


Figure 8. White Luminance and Uniformity Measurement Locations (5 points)

Center Luminance of white is defined as luminance values of center 5 points across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in Figure 7 for a total of the measurements per display.

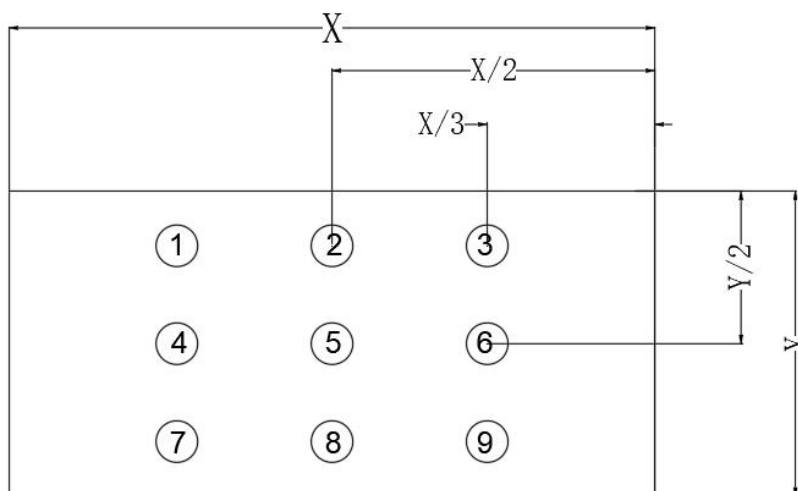


Figure 9. Uniformity Measurement Locations (9points)

The White luminance uniformity on LCD surface is then expressed as : $\Delta Y5$ = Minimum Luminance of five points / Maximum Luminance of five points (see Figure 8) , $\Delta Y9$ = Minimum Luminance of 9 points /Maximum Luminance of 9 points (see Figure 9).

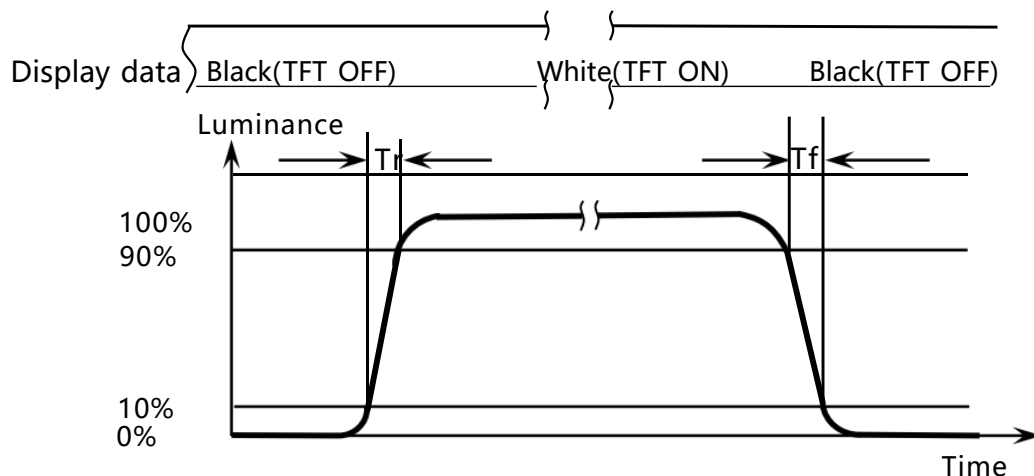
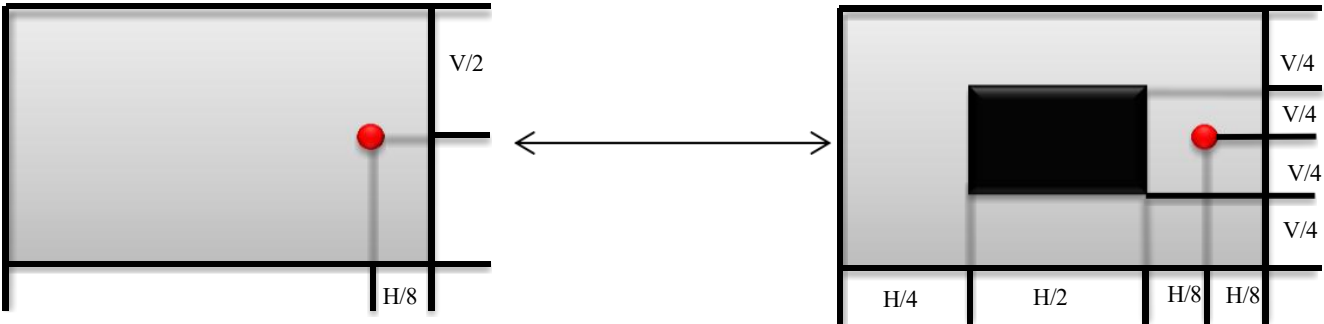


Figure 10. Response Time Testing

The electro-optical response time measurements shall be made as shown in Figure 10 by switching the “data” input signal ON and OFF. T_r : The luminance to change from 10% to 90% , T_f : The luminance to change from 90% to 10% .

The test system : LMS PR810

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$$\text{Cross Talk (\%)} = \left| \frac{Y_B - Y_A}{Y_B} \right| \times 100$$

Figure 11. Cross Talk Modulation Test Description

Where:

Y_A = Initial luminance of measured area (cd/m²)

Y_B = Subsequent luminance of measured area (cd/m²)

The location measured will be exactly the same in both patterns. The test background gray is L127.

Cross Talk of one area of the LCD surface by another shall be measured by comparing the luminance (Y_A) of a 10 ± 1 mm diameter area, with all display pixels set to a gray level 127, to the luminance (Y_B) of that same area when any adjacent area is driven dark.(Refer to Figure 11)

The test system: PR730

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