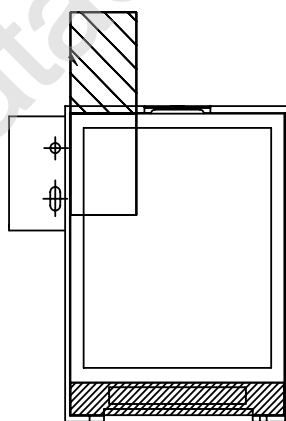




PRODUCT SPECIFICATION

HDA180

128 x160 TFT COLOR GRAPHICS
LCD DISPLAY MODULE



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1.MECHANICAL DATA

NO	ITEM	CONTENTS	UNIT
1	Product No.	HDA180	—
2	Module Size	34.0 (W) x 46.7 (H) x 4.4 (D)	mm
3	Dot Size	0.07 (W) x 0.214 (H)	mm
4	Dot Pitch	0.074 (W) x 0.222 (H)	mm
5	Active Area	28.416 (W) x 35.52 (H)	Dot
6	Number of Dots	128 RGB (W) x 160 (H)	—
7	LCD Display Mode	TFT Module	—
8	Rear Polarizer	Color Transmissive Type	—
9	Viewing Direction	12	O'clock
10	Backlight	LED (White)	—
11	Controller	HCD66773RBP (COG, 65K colors)	—
12	Weight	10 (Approx.)	g

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2. ABSOLUTE MAXIMUM RATINGS

(1) ELECTRICAL ABSOLUTE RATINGS

VSS=0V

	SYMBOL	MIN.	MAX.	UNIT	COMMENT
Power Supply for Logic	VCC-GND	-0.3	4.6	V	
Input Voltage	VI	-0.3	VCC	V	
Static Electricity	-	-	-	-	Note 1

Note 1 LCM should be grounded during handling LCM.

(2) ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	WIDE TEMP.			
	OPERATING		STORAGE	
	MIN.	MAX.	MIN.	MAX.
Ambient Temperature	-20	70	-40	80
Humidity (Without Condensation)	Note 2,4		Note 3,4	

Note 2 $T_a \leq 70^{\circ}\text{C}$: 75%RH max

Note 3 Please refer to item of reliability test

Note 4 Background color will change slightly depending on ambient temperature.

That phenomenon is reversible.

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3.ELECTRICAL CHARACTERISTICS

3-1.ELECTRICAL CHARACTERISTICS OF LCM

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Power Supply Voltage	VCC	—	2.5	2.8	3.3	V
	VCI	—	2.5	2.8	3.3	
Input Voltage	VIH	H level	0.7VCC	—	VCC	V
	VIO	L level	-0.3	—	0.2VCC	
LC Driving Voltage	VGH *1)	—	12	—	20	V *3)
	VGL *2)		-10	—	-4	
	Vcom		-2	—	4	
	ΔVpMax		0.2	—	1.0	
	ΔVpMin		0.2	—	1.0	
Power Supply Current	IDD	Normal Picture	—	4.0	6.0	mA
		Partial Display (32 Duty)	—	3.0	4.5	
		Stand by	—	0.4	0.6	
		Moving Picture	—	6.0	10.0	
Surface Luminance	L	Pattern: (ILED = 15mA) Dots All On(White)	120	150	—	cd/m ²
		Pattern: (ILED = 15mA) Dots All Off(Black)	—	0.5	1.0	
Contrast Ratio(LCM)	LCD	Cr	$\frac{L(White)}{L(Black)}$	120	150	—
Uniformity	LCD	U	PATTERN: (Dots All On) (White)	75	—	—

Notes:

- *1) VGH is TFT Gate on operating Voltage.
- *2) VGL is TFT Gate off operating Voltage, VGL signal must be fluctuates with same phase as Vcom when Storage on Gate structure.
- *3) Vcom must be adjusted to optimize display quality_Crostalk,Contrast Ratio and etc.
- *4) Register Setting :

Reg.	Set.	Reg.	Set.	Reg.	Set.	Reg.	Set.
00h	0001h	03h	0008h	36h	0707h	17h	9F00h
07h	0104h	04h	0000h	37h	0300h	07h	0105h
0Dh	0212h	0Eh	2E19h	3Ah	0000h	07h	0125h
0Eh	2E19h	0Dh	0212h	3Bh	0000h	07h	0127h
01h	0313h	30h	0000h	0Fh	0000h	07h	0137h
02h	0700h	31h	0605h	11h	0000h		
05h	1010h	32h	0407h	14h	9F00h		
06h	0000h	33h	0200h	15h	9F5Dh		
0Bh	4008h	34h	0203h	21h	9F02h		
0Ch	0002h	35h	0707h	16h	8102h		

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3-2.ELECTRICAL CHARACTERISTICS OF BACKLIGHT

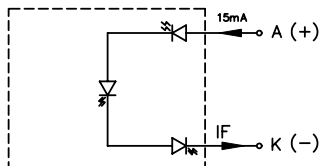
Used LED Rating

Temp.=25°C

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
Peak forward current	I _P	—	—	30	mA	—
Maximum reverse voltage	V _R	—	—	15	V	—
Applied forward current	I _F	—	15	20	mA	at V _F = 9.9 V
Applied forward voltage	V _F	—	9.9	12.0	V	at I _F = 15 mA
LED power consumption	P _F	—	0.15	—	W	—
AVG.X OF 1931 C.I.E.	X	0.28	0.31	0.34	—	—
AVG.Y OF 1931 C.I.E.	Y	0.28	0.31	0.34	—	—
LED life time	L _L	—	10000	—	hrs	at I _F = 15 mA (*1)

(*1) LED life time is defined as follows : The final brightness is at 50% of original brightness .

LED B/L



Application condition

LED Data

1. Manufacturer : NICHIA.
2. Model : NSCW335.
3. Luminous Intensity : Rank T.
4. Color Rank : Rank b1

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4.OPTICAL CHARACTERISTICS

4.1 Optical Char. of LCD Panel

Parameter	SYMBOL	Values			Unit	NOTE
		MIN.	TYP.	MAX.		
Response Time	Tr+Tf	—	56	—	ms	NOTE 2
Contrast Ratio	C/R	200	300	—		*1)
θ(Viewing Angle)		—	F: 45 R: 15	—		NOTE 5
φ(Viewing Angle)		—	L: 45 R: 45	—		
Degree of Saturation	NTSC	—	40	—	%	

*1) Contrast Ratio(CR) is define mathematically as :

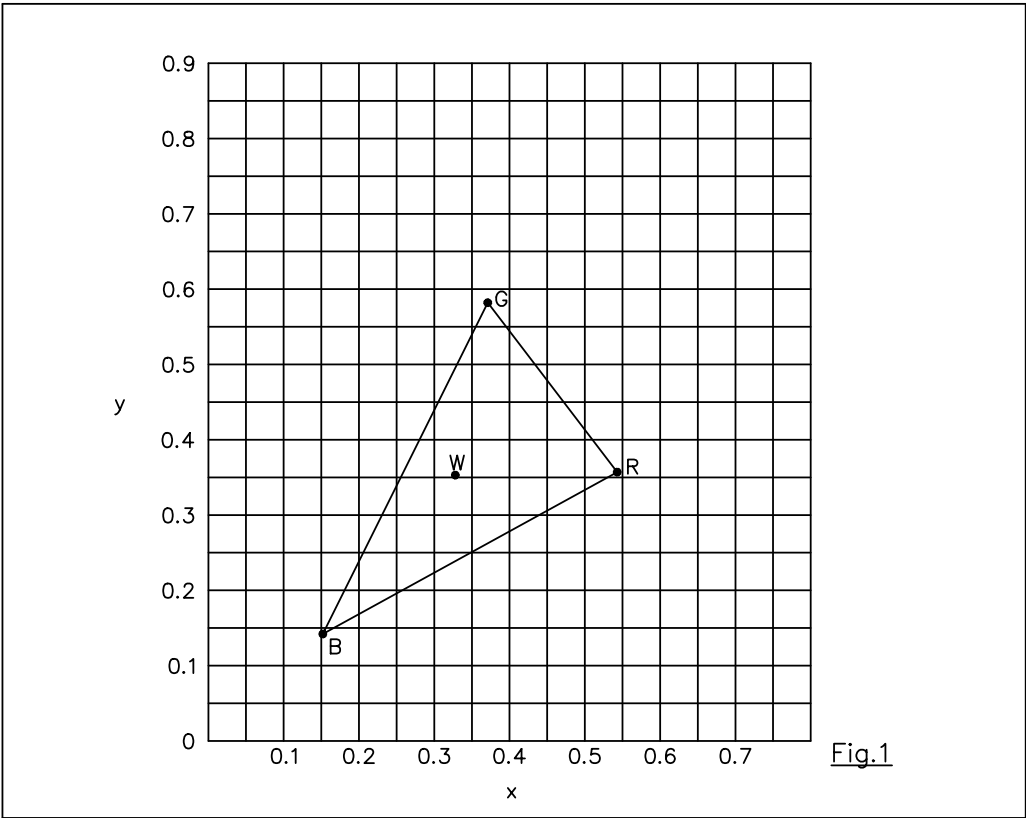
$$\text{Contrast Ratio} = \frac{\text{Serface Luminance with all white pixels}}{\text{Serface Luminance with all black pixels}}$$

4.2 Color of CIE Coordinate

Ta = 25°C Tolerance : ±0.02

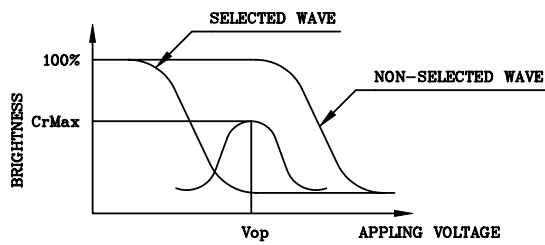
ITEM		SYMBOL	CONDITION	VALUE	NOTE
Color of CIE Coordinate	Red	X	$\phi=0^{\circ}$, $\theta=0^{\circ}$	0.543	Note✳
		y		0.357	
	Green	X		0.371	
		y		0.582	
	Blue	X		0.152	
		y		0.142	
	White	X		0.328	
		y		0.353	

Note✳ Measuring at position 3 on Fig.1 CIE chromaticity diagram

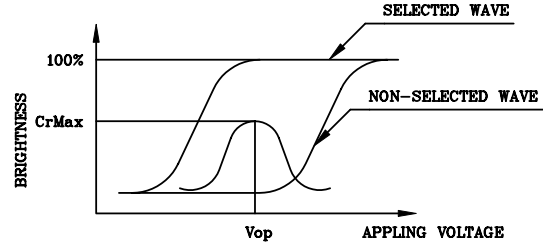


(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



(negative type)

*Conditions

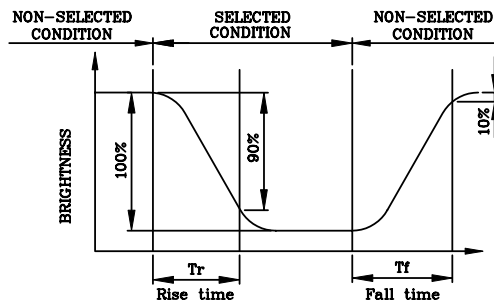
Viewing Angle : 0

Frame Frequency : 70Hz

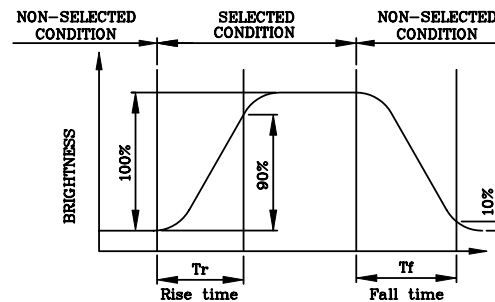
Applying Waveform : 1/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



(negative type)

*Conditions

Operating Voltage : Vop

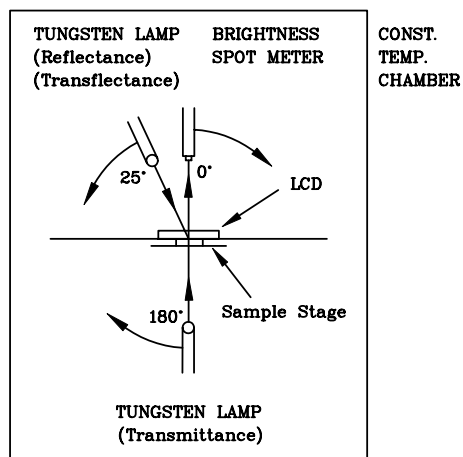
Viewing Angle (θ, ϕ) : (0,0)

Frame Frequency : 70Hz

Applying Waveform : 1/N duty 1/a bias

(NOTE 3)

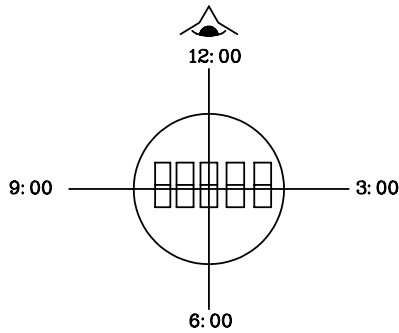
Description of Measuring Equipment and Driving Waveforms



CONST.
TEMP.
CHAMBER

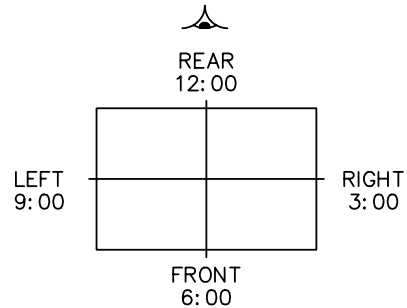
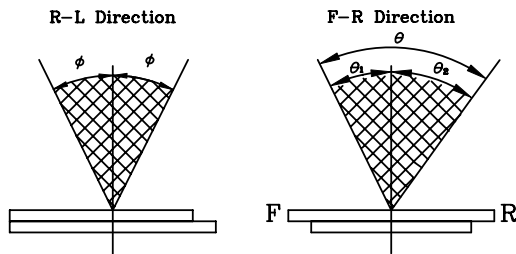
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



*For This Product

The Viewing Direction Is 6 O'clock
So $\theta_1 > \theta_2$

$$\theta = \theta_1 + \theta_2$$

*Conditions

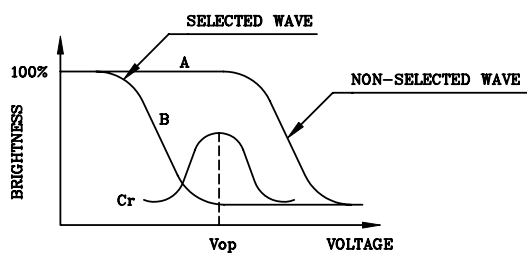
Operating Voltage : V_{op}

Applying Waveform : 1/N duty 1/a bias

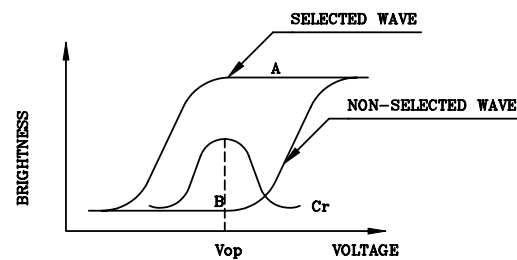
Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



(negative type)

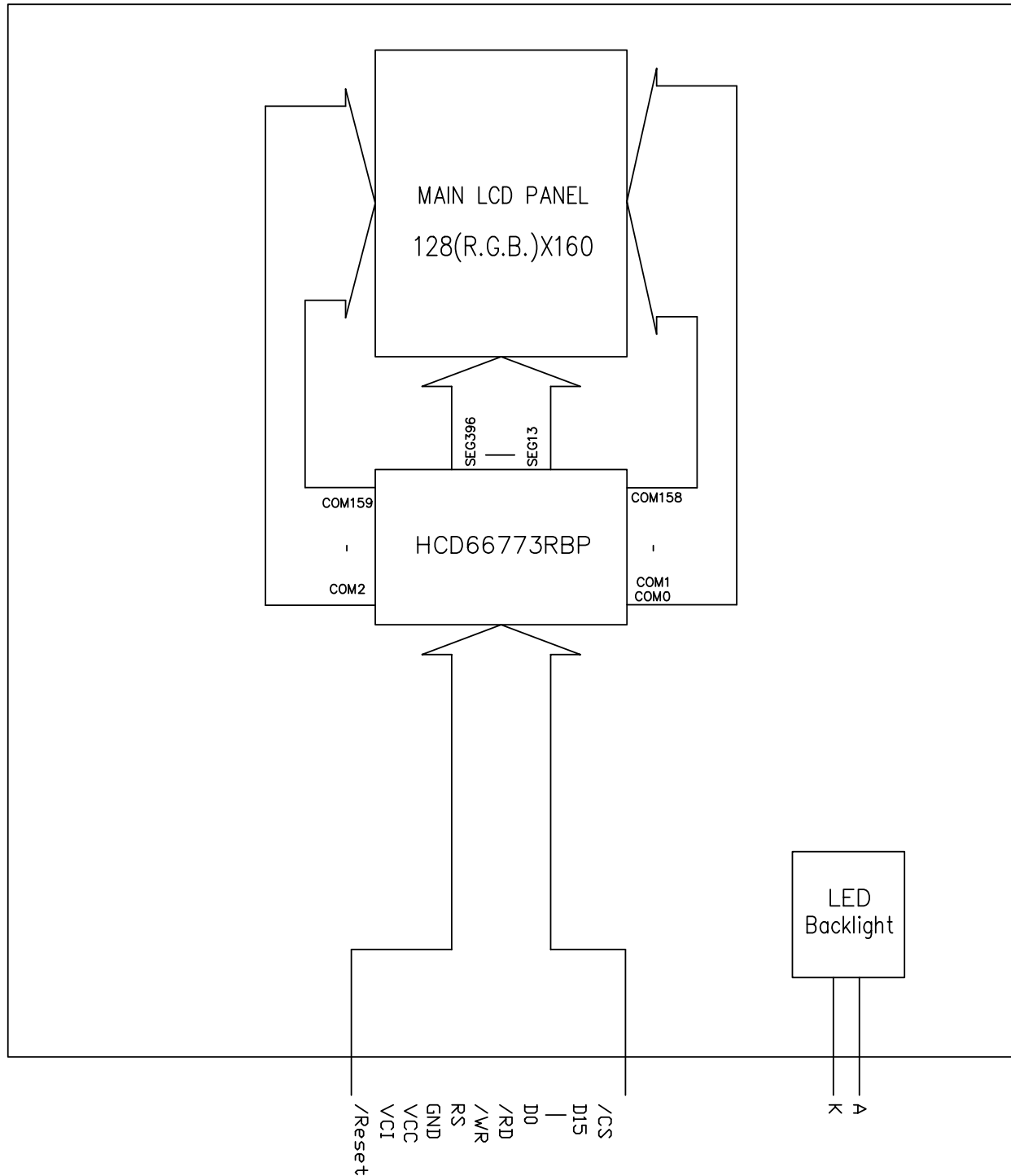
$$\text{Contrast Ratio : } Cr = A/B$$

*Conditions

Viewing Angle : 0

Applying Waveform : 1/N duty 1/a bias

5. BLOCK DIAGRAM



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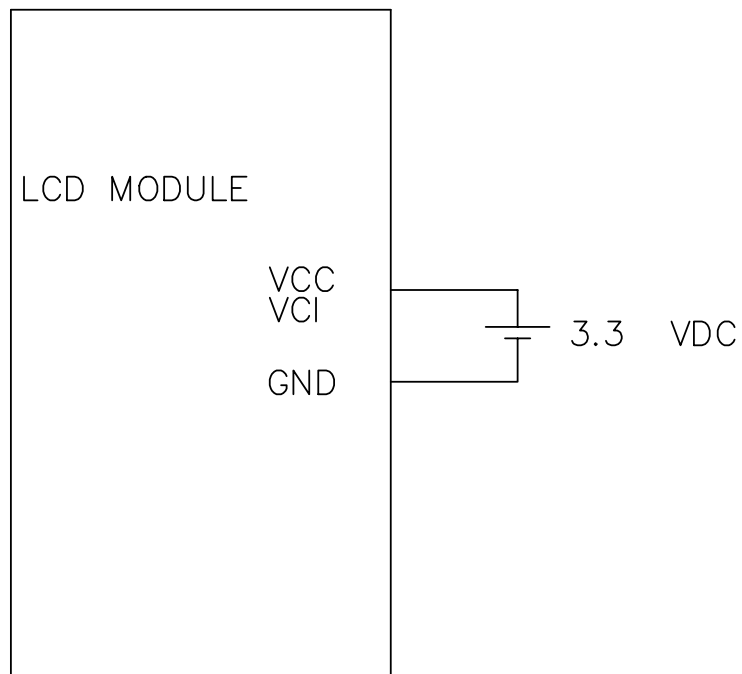
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6.INTERNAL PIN CONNECTION

Pin No.	Symbol	Function
1	NC	No Connection
2	GND	Power Ground
3	GND	Power Ground
4	/CS	Chip Select
5	RS	Command(L)/Data(H)
6	/WR	Write
7	/RD	Read
8	D0	Data 0
9	D1	Data 1
10	D2	Data 2
11	D3	Data 3
12	D4	Data 4
13	D5	Data 5
14	D6	Data 6
15	D7	Data 7
16	D8	Data 8
17	D9	Data 9
18	D10	Data 10
19	D11	Data 11
20	D12	Data 12
21	D13	Data 13
22	D14	Data 14
23	D15	Data 15
24	/Reset	System Reset
25	VCC	Logic Power
26	VCI	DC/DC Converter Power
27	NC	No Connection

7. POWER SUPPLY



8. TIMING CHARACTERISTICS

PLEASE REFER TO HITACHI HCD66773RBP SPEC.

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8-2. DISPLAY SEQUENCE

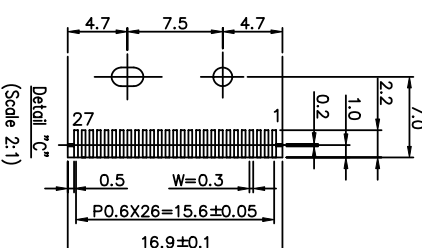
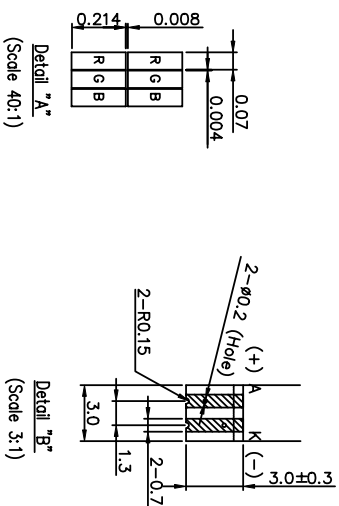
	COLUMN 1			COLUMN 2		
ROW1	R1	G1	B1	R2	G2	B2
ROW2	R1	G1	B1	R2	G2	B2

COLUMN 127			COLUMN 128		
R127	G127	B127	R128	G128	B128
R127	G127	B127	R128	G128	B128

ROW159	R1	G1	B1	R2	G2	B2
ROW160	R1	G1	B1	R2	G2	B2

R127	G127	B127	R128	G128	B128
R127	G127	B127	R128	G128	B128

Figure 1 is a technical drawing showing a detail of the component assembly. It includes labels for 'Conductor Side' and 'Component Area'. Dimensions are specified as 0.2 Max., 12.0, 10.0, and 3.0 ± 0.2 (3.3) and (4.4). A 'View Direction' arrow is also present.



3.Driver IC : "Hitachi" HD66773R or Compatible

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