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Specification

Part Number:	MCT024D12W240320PML
Version:	
Date:	

Revision

No.	Date	Description	Item	Page

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DOC.	DATASHEET STATEMENT

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4. As the difference in test standard and test conditions, also Midas insufficient familiarity with the actual LCD using environment, all the referred information in this DATASHEET (including the icons) only have two functions:
   4.1: providing quick reference when you are judging whether or not the product meets your requirements.
   4.2: listing out definitely the tolerance.

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5. The sequence of the icons is random and doesn't indicate the importance grade.
6. Icons explanation

Midas 2006 version logo.Midas is an integrated manufacturer of flat panel display (FPD). Midas supplies TN, HTN, STN, FSTN monochrome LCD panel; COB, COG, TAB LCD module; and all kinds of LED backlight.

FAST RESPONSE TIME
This icon on the cover indicates the product is with high response speed; Otherwise not.

PROTECTION CIRCUIT
This icon on the cover indicates the product is with protection circuit; Otherwise not.

HIGH CONTRAST
This icon on the cover indicates the product is with high contrast; Otherwise not.

LONG LIFE VERSION
This icon on the cover indicates the product is long life version (over 9K hours guaranteed); Otherwise not.

WIDE VIEWING SCOPE
This icon on the cover indicates the product is with wide viewing scope; Otherwise not.

Anti UV VERSION
This icon on the cover indicates the product is against UV line. Otherwise not.

RoHS COMPLIANCE
This icon on the cover indicates the product meets ROHS requirements; Otherwise not.

OPERATION TEMPERATURE RANGE
This icon on the cover indicates the operating temperature range (X-Y).

3TIMEs 100% QC EXAMINATION
This icon on the cover indicates the product has passed Midas thrice 100% QC. Otherwise not.

TWICE SELECTION OF LED MATERIALS
This icon on the cover indicates the LED had passed Midas twice strict selection which promises the product's identical color and brightness; Otherwise not.

Vlcm = 3.0V
This icon on the cover indicates the product can work at 3.0V exactly; otherwise not.

N SERIES TECHNOLOGY (2008 developed)
New structure, new craft, new technology and new materials inside both LCD module and LCD panel to improve the "RainBow"

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1. GENERAL DESCRIPTION

The MCT024D12W240320PML is a 240RGB320 dot-matrix TFT LCD module. It has an TFT panel composed of 240RGB segments and 320 commons. The LCM can be easily accessed by micro controller via parallel interface.

2. FEATURES

Display Mode	TFT/262K COLOR
Display Format	Graphic 240RGB320 Dot-matrix
Input Data	Parallel data input from MPU
Screen size(inch)	2.4'(diagonal)
Viewing Direction	12 O'clock
Interface	8080 16&8-bits data bus
Driver	ILI9325D
Backlight type	White LED

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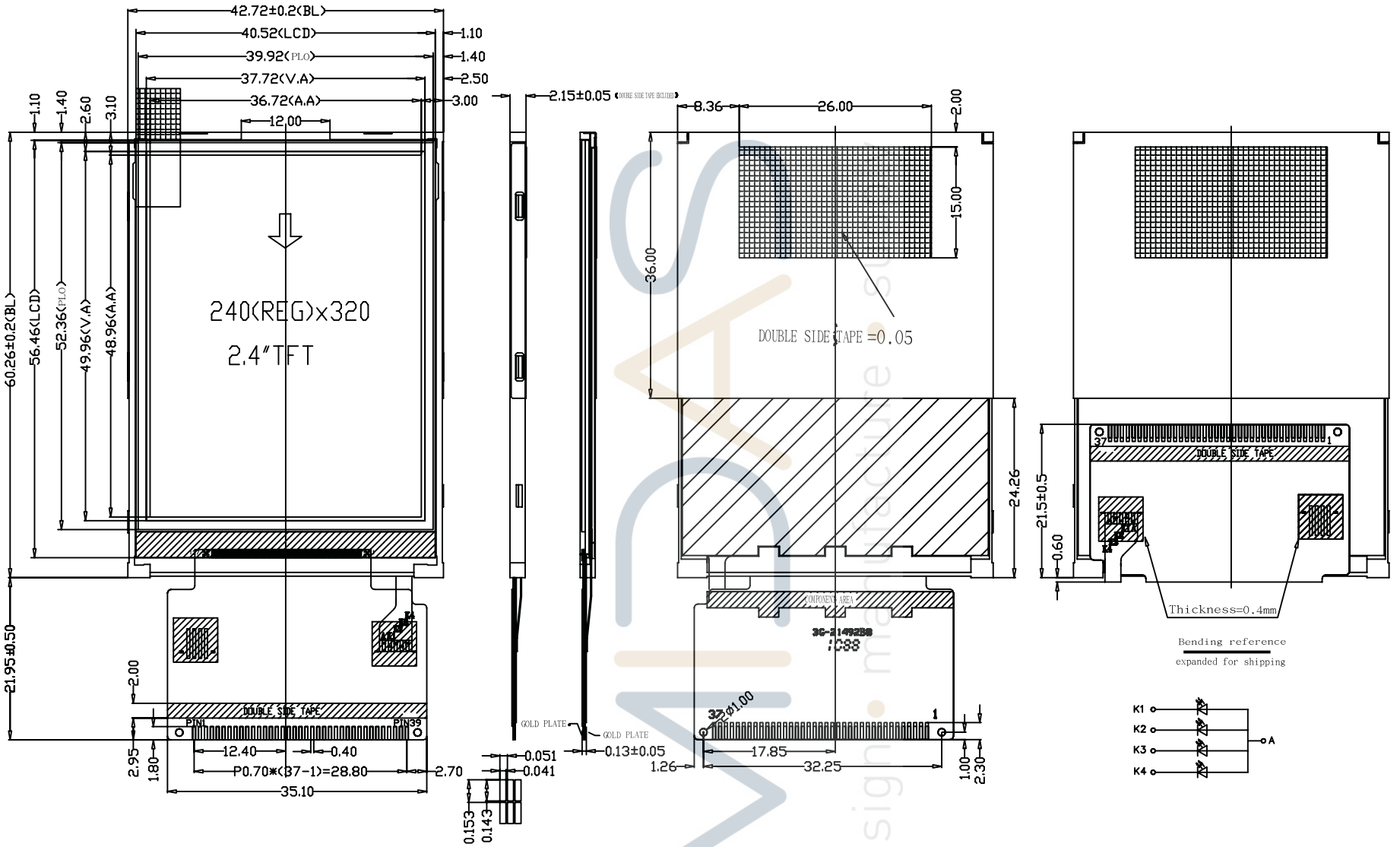
3. MECHANICAL SPECIFICATION

Item	Specifications	Unit
Dimensional outline	42.72(W)x60.26(H)x3.4(T) (FPC not include)	mm
Resolution	240RGB320 DOT	dots
Active Area	36. 72 (W) × 48.96 (H)	mm
Dots pitch	0.153 (W) × 0.153(H)	mm

4. MECHANICAL DIMENSION



1	DB0
2	DB1
3	DB2
4	DB3
5	GND1
6	IOVCC
7	/CS
8	RS
9	/WR
10	/RD
11	IM0
12	XL(NC)
13	YU(NC)
14	XR(NC)
15	YD(NC)
16	LED-A
17	LED-K1
18	LED-K2
19	LED-K3
20	LED-K4
21	FMARK
22	DB4
23	DB8
24	DB9
25	DB10
26	DB11
27	DB12
28	DB13
29	DB14
30	DB15
31	/RESET
32	VCI
33	VCI
34	GND
35	DB5
36	DB6
37	DB7

NOTE: ILI9325C

REVISED RECORD		
A		
B		
C		
D		
E		

1. DISPLAY TYPE	262K TFT	5. OPERATIVE VOLTAGE	3.0v
2. VIEWING DIRECTION	12 O'CLOCK	6. OPERATIVE TEMP	-20° C~70° C
3. POLARIZER MODE	TRANSMISSIVE	7. STORAGE TEMP	-30° C~80° C
4. BACKLIGHT TAPE	WHITE LED	8. CONNECTOR	TCP

Drawn	wwf							
Check	ljl	Page:	1 of 6	Unit:	mm	Date:		2010-9-21
Approve	lzf	Rev:	0.0	Scale:	1/1	Projection:		
Dwn.No								

5. MAXIMUM RATINGS

The absolute maximum rating is listed on following table. When ILI9325D is used out of the absolute maximum ratings, the ILI9325D may be permanently damaged. To use the ILI9325D within the following electrical characteristics limit is strongly recommended for normal operation. If these electrical characteristic conditions are exceeded during operation, the ILI9325D will malfunction and cause poor reliability.

Item	Symbol	Unit	Value	Note
Power supply voltage (Digital)	IOVCC-GND	V	-0.3 ~ + 4.6	1, 2
Power supply voltage (Analog)	VCI – GND	V	-0.3 ~ + 4.6	1, 2
Driver supply voltage range	DDVDH – GND	V	-0.3 ~ + 6.0	1, 4
	VCOMH-VCOML	V	-0.3 ~ + 6.0	1, 4
	GND –VCL	V	-0.3 ~ + 4.6	1
	DDVDH – VCL	V	-0.3 ~ + 9.0	1, 5
	VGH – VGL	V	-0.3 ~ + 30	6, 7
Input voltage	Vt	V	-0.3 ~ IOVCC+ 0.3	1
Operating temperature	Topr	ºC	-40 ~ + 85	8
Storage temperature	Tstg	ºC	-55 ~ + 110	8

Notes:
1. GND must be maintained
2. (High) VCI ≥ GND (Low), (High) IOVCC ≥ GND (Low).
3. Make sure (High) VCI ≥ GND (Low).
4. Make sure (High) DDVDH ≥ GND (Low).
5. Make sure (High) DDVDH ≥ VCL (Low).
6. Make sure (High) VGH ≥ GND (Low).
7. Make sure (High) GND ≥ VGL (Low).
8. For die and wafer products, specified up to 85ºC.

6. ELECTRICAL CHARACTERISTICS

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Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Supply Voltage	Logic	V_{DD}	-	2.4	3.0	3.6	V
Input Voltage	H level	V_{IH}	-	0.8VCC	-	VCC	V
	L level	V_{IL}		-0.3	-	0.2VCC	
Current Consumption		I_{DD}	-	-	TBD	-	mA

BACKLIGHT

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply Voltage	V_{DD}	—	3.0	3.2	3.4	V
Current Consumption	I_{DD}	—	—	60	—	mA
Operating temperature	T_{opr}		-20	—	+70	℃
Storage temperature	T_{stg}		-30	—	80	℃

7. MODULE FUNCTION DESCRIPTION

7.1. PIN DESCRIPTION

Pin No.	Symbol	I/O	Functional
1~4	DB0~DB3	I/O	Data bus DB0~DB3
5	GND	P	System ground
6	IOVCC	P	Power supply for internal logic:1.65~3.3V.
7	CS	I	Chip select signal. Low: chip can be accessed; High: chip cannot be accessed
8	RS	I	Display data/command selection pin in MCU interface RS='1': display data RS='0': command data
9	/WR	I	Write enable clock input pin. The data on DB0 to DB15 are latched at the rising edge of the WR signal.
10	RD	I	Read enable clock input pin. When RD is 'L', DB0 to DB15 are in an output status.
11	IM0	I	IM0=0，16-bit interface is selected,DB[15:8],DB[7:0] IM0=1，8-bit interface is selected,DB[15:8] Unused pins must be fixed to GND level.
12	XL	P	Touch panel XL
13	YU	P	Touch panel YU
14	XR	P	Touch panel XR
15	YD	P	Touch panel YD
16	LEDA	P	Power supply anode input for backlight.
17~20	LEDK1~4	P	Power supply cathode input for backlight.
21	FMARK	O	Output a frame head pulse signal.
22	DB4	I/O	Data bus DB4
23~30	DB8~DB15	I/O	Data bus DB8~DB15
31	RESET	I	Reset input Pin. Initializes the ILI9325D with a low input.
32	VCI	P	Power supply：2.5~3.3V
33	VCI	P	Power supply：2.5~3.3V
34	GND	P	System ground
35~37	DB5~DB7	I/O	Data bus DB5~DB7

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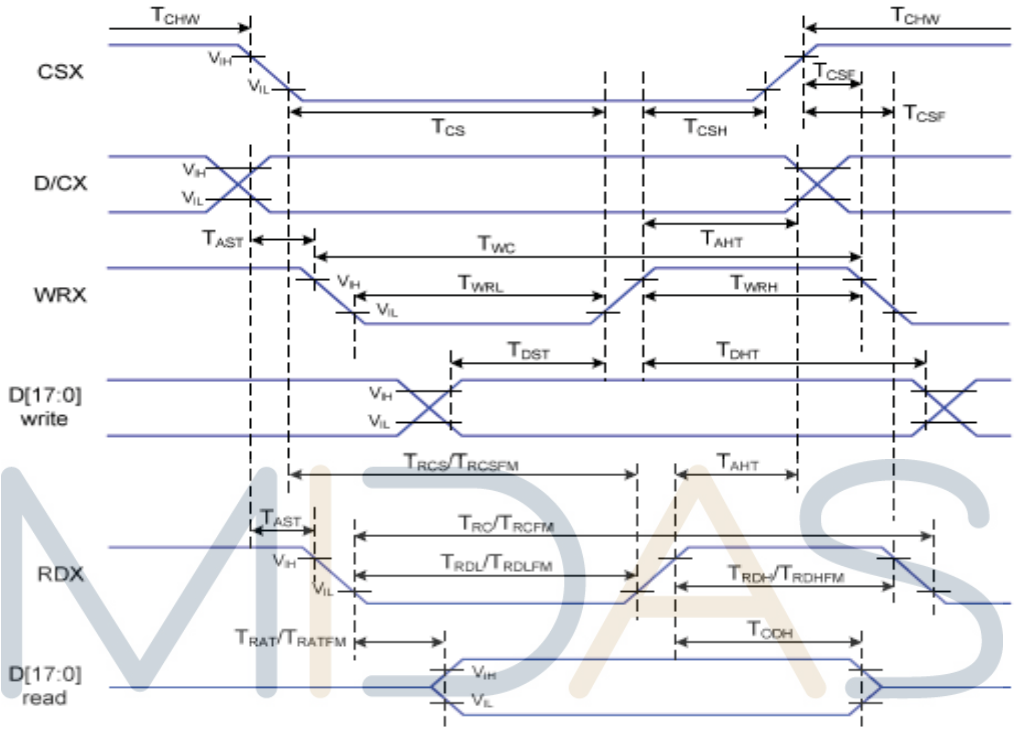
7.2. TIMING CHARACTERISTICS

7.2.1. Parallel 8080-series Interface Timing Characteristics



Signal	Symbol	Parameter	Min	Max	Unit	Description
D/CX	T_{AST}	Address setup time	TBD	TBD	ns	-
	T_{AHT}	Address hold time (Write/Read)	TBD	TBD	ns	
CSX	T_{CHW}	Chip select "H" pulse width	TBD	TBD	ns	-(3-transfer for one pixel)
	T_{CS}	Chip select setup time (Write)	TBD	TBD	ns	
	T_{RCS}	Chip select setup time (Read ID)	TBD	TBD	ns	
	T_{RCSFM}	Chip select setup time (Read RAM)	TBD	TBD	ns	
	T_{CSF}	Chip select wait time (Write/Read)	TBD	TBD	ns	
	T_{CSH}	Chip select hold time	TBD	TBD	ns	
WRX	T_{WC}	Write cycle	TBD	TBD	ns	-(15Mhz)
	T_{WRH}	Control pulse "H" duration	TBD	TBD	ns	
	T_{WRL}	Control pulse "L" duration	TBD	TBD	ns	
RDX (ID)	T_{RC}	Read cycle (ID)	TBD	TBD	ns	When read ID data
	T_{RDH}	Control pulse "H" duration (ID)	TBD	TBD	ns	
	T_{RDL}	Control pulse "L" duration (ID)	TBD	TBD	ns	
RDX (FM)	T_{RCFM}	Read cycle (FM)	TBD	TBD	ns	When read from frame memory
	T_{RDHFM}	Control pulse "H" duration (RAM)	TBD	TBD	ns	
	T_{RDLFM}	Control pulse "L" duration (RAM)	TBD	TBD	ns	
D[17:0]	T_{DST}	Data setup time	TBD	TBD	ns	For maximum CL=30pF For minimum CL=8pF
	T_{DHT}	Data hold time	TBD	TBD	ns	
	T_{RAT}	Read access time (ID)	TBD	TBD	ns	
	T_{RATFM}	Read access time (FM)	TBD	TBD	ns	
	T_{ODH}	Output disable time	TBD	TBD	ns	

Note 1: VDDI=1.65 to 3.3V, VDD=2.45 to 3.3V, AGND=DGND=0V, Ta=-40 to 85 ℃

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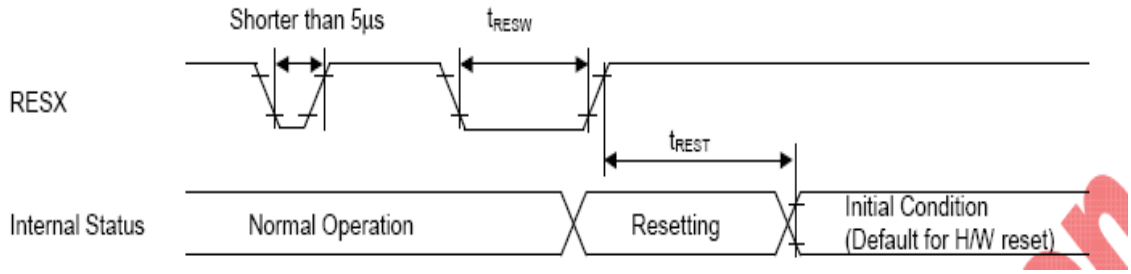
7.2.2. RESET TIMING



Reset input timing

VSS=0V, VDDI=1.65V to 1.95V, VDD=2.45V to 2.9V,Ta = -30 to 70℃)

Symbol	Parameter	Related Pins	MIN	TYP	MAX	Note	Unit
t_{RESW}	*1) Reset low pulse width	RESX	TBD	TBD	TBD	-	us
t_{REST}	*2) Reset complete time	-	TBD	TBD	TBD	When reset applied during Sleep in mode	ms
		-	TBD	TBD	TBD	When reset applied during Sleep out mode	ms

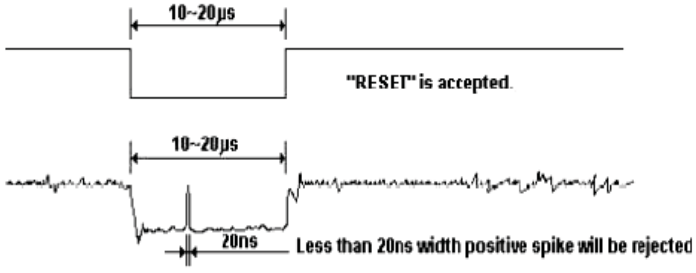
Note 1) Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below.

RESX Pulse	Action
Shorter than 5us	Reset Rejected
Longer than 10us	Reset
Between 5us and 10us	Reset starts (It depends on voltage and temperature condition.)

Note 2. During the resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out –mode. The display remains the blank state in Sleep In –mode) and then return to Default condition for H/W reset.

Note 3. During Reset Complete Time, ID2 and VCOMOF value in OTP will be latched to internal register during this period. This loading is done every time when there is H/W reset complete time (tREST) within 5ms after a rising edge of RESX.

Note 4. Spike Rejection also applies during a valid reset pulse as shown below:



Note 5. It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

8. LCD OPTICAL CHARACTERISTICS

(Note1，Note2)

(Using CPT LC+ EWV Polarizer+Corresponding Backlight, reference only)

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
Transmittance		T		4.5	5		%	
Contrast Ratio		CR	*1)		(300)	-	--	Note 3
Response Time		Tr+ Tf	*3)	-	(30)	(40)	ms	Note 4
Viewing Angle	Vertical	θ *2)	CR≧10	(45)	(60)	-		
				(35)	(50)	-		Note 5
	Horizontal	ϕ *2)		(50)	(65)	-		
				(50)	(65)	-		
Color Filter Chromacicity	White	x	θ=ϕ= 0°	0.288	0.308	0.328		
		y		0.322	0.342	0.362		Note 6
		Y		27.8	30.8	33.8		
	Red	x	θ=ϕ= 0°	0.633	0.653	0.673		
		y		0.311	0.331	0.351		
		Y		15.4	18.4	21.4		
	Green	x	θ=ϕ= 0°	0.291	0.311	0.331		
		y		0.554	0.574	0.594		
		Y		55.0	59.0	63.0		
	Blue	x	θ=ϕ= 0°	0.114	0.134	0.154		
		y		0.114	0.134	0.154		
		Y		12.0	15.0	18.0		
	NTSC			-	61	-	%	

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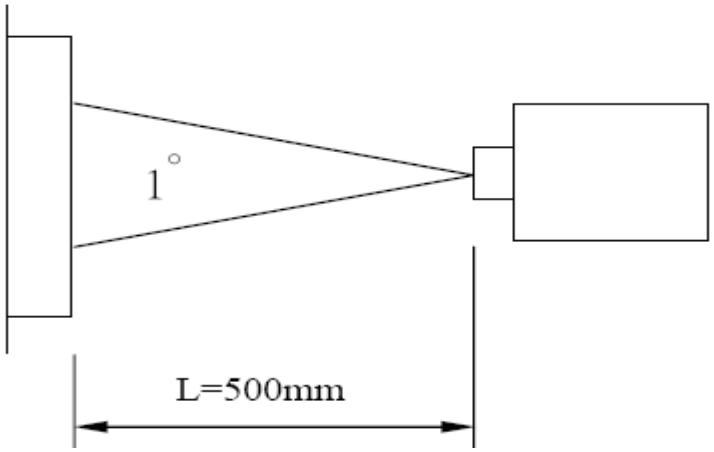
Note 1.Ambient condition：25℃±2℃，60±10%RH，under 10 Lunx in the darkroom。

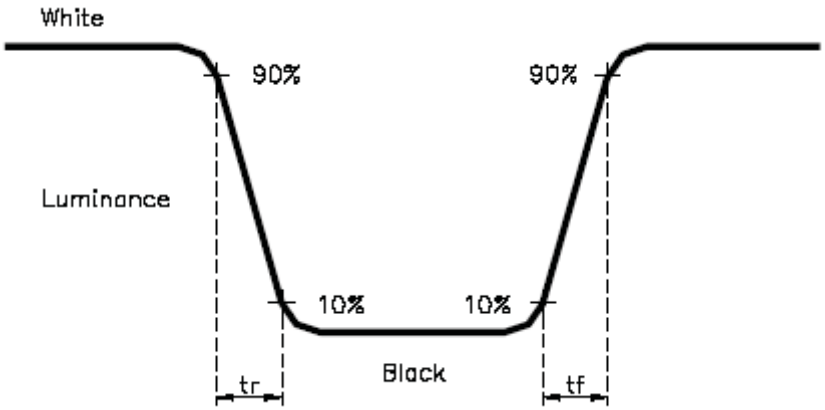
Note 2.Measure device：BM-5A (TOPCON)，viewing cone= 1°，I=20mA。



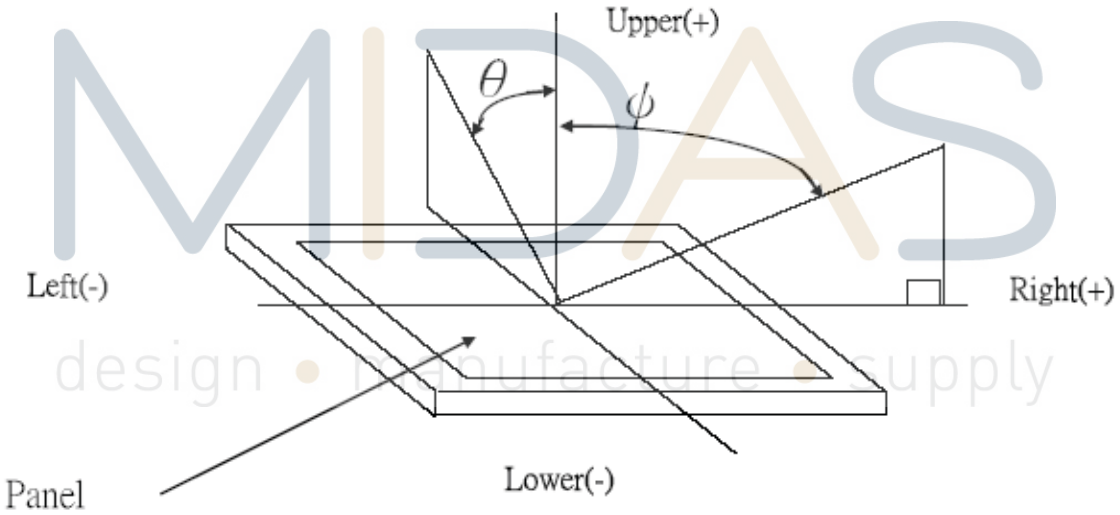
Note 3. Definition of Contrast Ratio：

CR = White Luminance (ON) / Black Luminance (OFF)

Note 4. Definition of response time : The response time is defined as the time interval between the 10% and 90% amplitudes.



Note 5. Definition of view angle(θ , ψ) :



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Note 6. Light source: C light.

9. RELIABILITY

9.1. MTBF

The LCD module shall be designed to meet a minimum MTBF value of 50000 hours with normal. (25°C in the room without sunlight)

9.2. TESTS

NO.	ITEM	CONDITION	CRITERION
1	HIGH TEMPERATURE OPERATING	55℃ 240Hrs	NO DEFECT IN COSMETIC AND OPERATIONAL FUNCTION ARE ALLOWABLE. TOTAL CURRENT CONSUMPTION SHOULD BELOW DOUBLE OF INITIAL VALUE.
2	LOW TEMPERATURE OPERATING	0℃ 240Hrs	
3	HIGH HUMIDITY NON-OPERATING	70℃ ,90%RH ,96Hrs	
4	HIGH TEMPERATURE NON-OPERATING	70℃ 240Hrs	
5	LOW TEMPERATURE NON-OPERATING	-10℃ 240Hrs	
6	TEMPERATURE CYCLING NON-OPERATING	-20℃↔25℃↔70℃ 30Min 5Min 30Min 50 CYCLES	
7	VIBRATION NON-OPERATING	RANDOM WAVE 40~500HZ ACCELERATION:5g 50Sec/EACH DIRECTION (X,Y,Z)	

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