

EXAMINED BY :	EMERGING DISPLAY TECHNOLOGIES CORPORATION	FILE NO . CAS-0008907
Sam Chou		ISSUE : SEP.29, 2020
APPROVED BY:		TOTAL PAGE : 34
<i>Chris Wu</i>		VERSION : 5

CUSTOMER ACCEPTANCE SPECIFICATIONS

MODEL NO. :
ET050015DMA
 (RoHS)
 FOR MESSRS :

CUSTOMER'S APPROVAL

DATE :

BY :

RECORDS OF REVISION

DOC . FIRST ISSUE

NOV.08, 2019

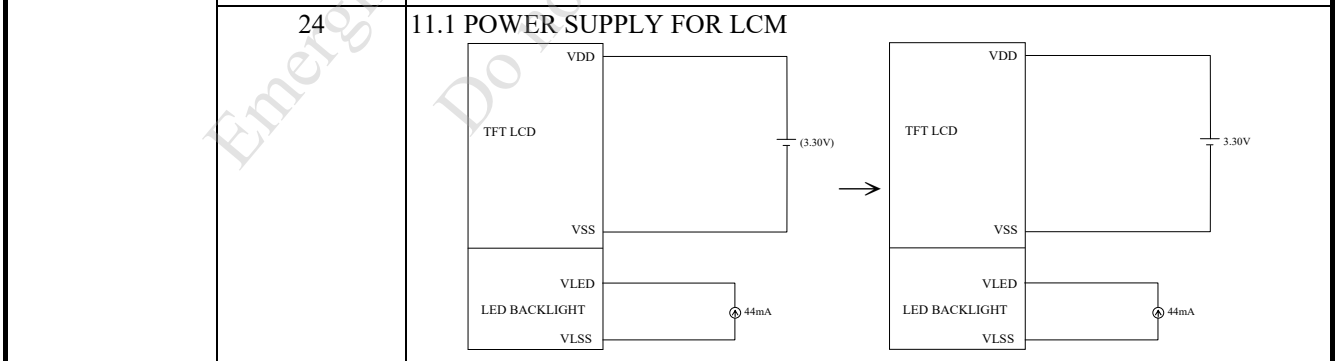
DATE	REVISED PAGE NO.	SUMMARY																																
JAN.20, 2020	3	4. ELECTRICAL CHARACTERISTICS POWER SUPPLY CURRENT: TYP.=(54)→(65);MAX.=(65)→(85)																																
	20	7. OUTLINE DIMENSIONS MARK Δ : MODIFY FPC DOUBLE TAPE																																
MAR.27, 2020	3	4. ELECTRICAL CHARACTERISTICS POWER SUPPLY VOLTAGE FOR LED BACKLIGHT: CONDITION: ILED=40mA→ILED=44mA																																
	18,19	6. OPTICAL CHARACTERISTICS <table border="1"> <thead> <tr> <th>ITEM</th> <th>SYMBOL</th> <th>CONDITION</th> <th>MIN.</th> <th>TYP.</th> <th>MAX.</th> <th>UNIT</th> <th>REMARK</th> </tr> </thead> <tbody> <tr> <td>THE BRIGHTNESS OF MODULE (CENTER)</td> <td>B</td> <td>$\theta_x=0^\circ, \theta_y=0^\circ$ VDD-VSS=3.30V ILED = 40mA (NTSC : 70%)</td> <td>(410)</td> <td>(460)</td> <td>—</td> <td>cd/m²</td> <td>NOTE (6)</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>ITEM</th> <th>SYMBOL</th> <th>CONDITION</th> <th>MIN.</th> <th>TYP.</th> <th>MAX.</th> <th>UNIT</th> <th>REMARK</th> </tr> </thead> <tbody> <tr> <td>THE BRIGHTNESS OF MODULE (CENTER)</td> <td>B</td> <td>$\theta_x=0^\circ, \theta_y=0^\circ$ VDD-VSS=3.30V ILED = 44mA (NTSC : 70%)</td> <td>(480)</td> <td>(530)</td> <td>—</td> <td>cd/m²</td> <td>NOTE (6)</td> </tr> </tbody> </table> NOTE (7) : (a)DEFINITION OF BRIGHTNESS UNIFORMITY ILED=40mA→ILED=44mA	ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK	THE BRIGHTNESS OF MODULE (CENTER)	B	$\theta_x=0^\circ, \theta_y=0^\circ$ VDD-VSS=3.30V ILED = 40mA (NTSC : 70%)	(410)	(460)	—	cd/m ²	NOTE (6)	ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK	THE BRIGHTNESS OF MODULE (CENTER)	B	$\theta_x=0^\circ, \theta_y=0^\circ$ VDD-VSS=3.30V ILED = 44mA (NTSC : 70%)	(480)	(530)	—	cd/m ²	NOTE (6)
	ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK																										
THE BRIGHTNESS OF MODULE (CENTER)	B	$\theta_x=0^\circ, \theta_y=0^\circ$ VDD-VSS=3.30V ILED = 40mA (NTSC : 70%)	(410)	(460)	—	cd/m ²	NOTE (6)																											
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK																											
THE BRIGHTNESS OF MODULE (CENTER)	B	$\theta_x=0^\circ, \theta_y=0^\circ$ VDD-VSS=3.30V ILED = 44mA (NTSC : 70%)	(480)	(530)	—	cd/m ²	NOTE (6)																											
24	11.1 POWER SUPPLY FOR LCM 																																	
JUL.01, 2020	2	3.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS AMBIENT TEMPERATURE: REMARK: ADD NOTE (3) NOTE (1) : Ta AT -30°C : WILL BE 48HRS MAX. 80°C : WILL BE 168HRS MAX.→THE ABSOLUTE MAXIMUM RATINGS OF THIS PRODUCT SHOULD NOT BE EXCEEDED AT ANY TIME. IF THESE RATINGS ARE EXCEEDED, THE PRODUCT'S PERFORMANCE IS NOT GUARANTEED AND THE PRODUCT MAY EXPERIENCE PERMANENT DAMAGE.																																
	3	4. ELECTRICAL CHARACTERISTICS POWER SUPPLY CURRENT: TYP.=(65)→(58), MAX.=(85)→(75)																																
	21	8. BLOCK DIAGRAM ADD NOTE (1)																																
23	10. INTERFACE SIGNALS <table border="1"> <thead> <tr> <th>NO.</th> <th>SYMBOL</th> <th>FUNCTION</th> </tr> </thead> <tbody> <tr> <td>32</td> <td>ID1</td> <td>ID PIN 1(DEFAULT PULL HIGH)</td> </tr> <tr> <td>33</td> <td>ID0</td> <td>ID PIN 0(DEFAULT PULL HIGH)</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>NO.</th> <th>SYMBOL</th> <th>FUNCTION</th> </tr> </thead> <tbody> <tr> <td>32</td> <td>NC</td> <td>NON CONNECTION</td> </tr> <tr> <td>33</td> <td>NC</td> <td>NON CONNECTION</td> </tr> </tbody> </table>	NO.	SYMBOL	FUNCTION	32	ID1	ID PIN 1(DEFAULT PULL HIGH)	33	ID0	ID PIN 0(DEFAULT PULL HIGH)	NO.	SYMBOL	FUNCTION	32	NC	NON CONNECTION	33	NC	NON CONNECTION															
NO.	SYMBOL	FUNCTION																																
32	ID1	ID PIN 1(DEFAULT PULL HIGH)																																
33	ID0	ID PIN 0(DEFAULT PULL HIGH)																																
NO.	SYMBOL	FUNCTION																																
32	NC	NON CONNECTION																																
33	NC	NON CONNECTION																																

RECORDS OF REVISION	DOC . FIRST ISSUE	NOV.08, 2019
---------------------	-------------------	--------------

DATE	REVISED PAGE NO.	SUMMARY
------	------------------	---------

SEP.29, 2020	3	<p>4. ELECTRICAL CHARACTERISTICS</p> <table border="1"> <thead> <tr> <th>ITEM</th> <th>SYMBOL</th> <th>CONDITION</th> <th>MIN.</th> <th>TYP.</th> <th>MAX.</th> <th>UNIT</th> <th>REMARK</th> </tr> </thead> <tbody> <tr> <td>POWER SUPPLY VOLTAGE</td> <td>VDD-VSS</td> <td>—</td> <td>(3.15)</td> <td>(3.3)</td> <td>(3.45)</td> <td>V</td> <td></td> </tr> <tr> <td>POWER SUPPLY CURRENT</td> <td>IDD</td> <td>—</td> <td>—</td> <td>(58)</td> <td>(75)</td> <td>mA</td> <td>NOTE (1)</td> </tr> <tr> <td>POWER SUPPLY VOLTAGE FOR LED BACKLIGHT</td> <td>VLED-VLSS</td> <td>ILED=44mA</td> <td>(18.55)</td> <td>(21)</td> <td>(23.45)</td> <td>V</td> <td>NOTE (2)</td> </tr> <tr> <td>LED LIFE TIME</td> <td>—</td> <td>IF=20mA (PER LED)</td> <td>(30K)</td> <td>—</td> <td>—</td> <td>HRS</td> <td>NOTE (4) NOTE (5)</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>ITEM</th> <th>SYMBOL</th> <th>CONDITION</th> <th>MIN.</th> <th>TYP.</th> <th>MAX.</th> <th>UNIT</th> <th>REMARK</th> </tr> </thead> <tbody> <tr> <td>POWER SUPPLY VOLTAGE</td> <td>VDD-VSS</td> <td>—</td> <td>3.15</td> <td>3.3</td> <td>3.45</td> <td>V</td> <td></td> </tr> <tr> <td>POWER SUPPLY CURRENT</td> <td>IDD</td> <td>—</td> <td>—</td> <td>58</td> <td>75</td> <td>mA</td> <td>NOTE (1)</td> </tr> <tr> <td>POWER SUPPLY VOLTAGE FOR LED BACKLIGHT</td> <td>VLED-VLSS</td> <td>ILED=44mA</td> <td>18.55</td> <td>21</td> <td>23.45</td> <td>V</td> <td>NOTE (2)</td> </tr> <tr> <td>LED LIFE TIME</td> <td>—</td> <td>IF=22mA (PER LED)</td> <td>30K</td> <td>—</td> <td>—</td> <td>HRS</td> <td>NOTE (4) NOTE (5)</td> </tr> </tbody> </table>	ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK	POWER SUPPLY VOLTAGE	VDD-VSS	—	(3.15)	(3.3)	(3.45)	V		POWER SUPPLY CURRENT	IDD	—	—	(58)	(75)	mA	NOTE (1)	POWER SUPPLY VOLTAGE FOR LED BACKLIGHT	VLED-VLSS	ILED=44mA	(18.55)	(21)	(23.45)	V	NOTE (2)	LED LIFE TIME	—	IF=20mA (PER LED)	(30K)	—	—	HRS	NOTE (4) NOTE (5)	ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK	POWER SUPPLY VOLTAGE	VDD-VSS	—	3.15	3.3	3.45	V		POWER SUPPLY CURRENT	IDD	—	—	58	75	mA	NOTE (1)	POWER SUPPLY VOLTAGE FOR LED BACKLIGHT	VLED-VLSS	ILED=44mA	18.55	21	23.45	V	NOTE (2)	LED LIFE TIME	—	IF=22mA (PER LED)	30K	—	—	HRS	NOTE (4) NOTE (5)
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK																																																																											
POWER SUPPLY VOLTAGE	VDD-VSS	—	(3.15)	(3.3)	(3.45)	V																																																																												
POWER SUPPLY CURRENT	IDD	—	—	(58)	(75)	mA	NOTE (1)																																																																											
POWER SUPPLY VOLTAGE FOR LED BACKLIGHT	VLED-VLSS	ILED=44mA	(18.55)	(21)	(23.45)	V	NOTE (2)																																																																											
LED LIFE TIME	—	IF=20mA (PER LED)	(30K)	—	—	HRS	NOTE (4) NOTE (5)																																																																											
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK																																																																											
POWER SUPPLY VOLTAGE	VDD-VSS	—	3.15	3.3	3.45	V																																																																												
POWER SUPPLY CURRENT	IDD	—	—	58	75	mA	NOTE (1)																																																																											
POWER SUPPLY VOLTAGE FOR LED BACKLIGHT	VLED-VLSS	ILED=44mA	18.55	21	23.45	V	NOTE (2)																																																																											
LED LIFE TIME	—	IF=22mA (PER LED)	30K	—	—	HRS	NOTE (4) NOTE (5)																																																																											

18	<p>6. OPTICAL CHARACTERISTICS</p> <table border="1"> <thead> <tr> <th>ITEM</th> <th>SYMBOL</th> <th>CONDITION</th> <th>MIN.</th> <th>TYP.</th> <th>MAX.</th> <th>UNIT</th> <th>REMARK</th> </tr> </thead> <tbody> <tr> <td rowspan="4">VIEWING ANGLE</td> <td>θ_{x+}</td> <td rowspan="4">CR ≥ 10</td> <td rowspan="4">$\theta_x=0^\circ$</td> <td>(75)</td> <td>(80)</td> <td>—</td> <td rowspan="4">deg. NOTE (2) NOTE (3)</td> </tr> <tr> <td>θ_{x-}</td> <td>(75)</td> <td>(80)</td> <td>—</td> </tr> <tr> <td>θ_{y+}</td> <td>(75)</td> <td>(80)</td> <td>—</td> </tr> <tr> <td>θ_{y-}</td> <td>(75)</td> <td>(80)</td> <td>—</td> </tr> <tr> <td>CONTRAST RATIO (CENTER)</td> <td>CR</td> <td>$\theta_x=0^\circ, \theta_y=0^\circ$</td> <td>(600)</td> <td>(800)</td> <td>—</td> <td>—</td> <td>NOTE (3)</td> </tr> <tr> <td>RESPONSE TIME</td> <td>TR(rise)+TF(fall)</td> <td>$\theta_x=0^\circ, \theta_y=0^\circ$</td> <td>—</td> <td>(30)</td> <td>(35)</td> <td>msec</td> <td>NOTE (4)</td> </tr> <tr> <td rowspan="8">COLOR CHROMATICITY (CENTER)</td> <td rowspan="2">WHITE</td> <td>Wx</td> <td rowspan="8">$\theta_x=0^\circ, \theta_y=0^\circ$ VDD-VSS=3.30V ILED = 44mA (NTSC : 70%)</td> <td>(0.22)</td> <td>(0.27)</td> <td>(0.32)</td> <td rowspan="8">—</td> <td rowspan="8">NOTE (5)</td> </tr> <tr> <td>Wy</td> <td>(0.23)</td> <td>(0.28)</td> <td>(0.33)</td> </tr> <tr> <td rowspan="2">RED</td> <td>Rx</td> <td>(0.58)</td> <td>(0.63)</td> <td>(0.68)</td> </tr> <tr> <td>Ry</td> <td>(0.29)</td> <td>(0.34)</td> <td>(0.39)</td> </tr> <tr> <td rowspan="2">GREEN</td> <td>Gx</td> <td>(0.27)</td> <td>(0.32)</td> <td>(0.37)</td> </tr> <tr> <td>Gy</td> <td>(0.58)</td> <td>(0.63)</td> <td>(0.68)</td> </tr> <tr> <td rowspan="2">BLUE</td> <td>Bx</td> <td>(0.10)</td> <td>(0.15)</td> <td>(0.20)</td> </tr> <tr> <td>By</td> <td>(0.02)</td> <td>(0.07)</td> <td>(0.12)</td> </tr> <tr> <td>THE BRIGHTNESS OF MODULE (CENTER)</td> <td>B</td> <td></td> <td>(480)</td> <td>(530)</td> <td>—</td> <td>cd/m²</td> <td>NOTE (6)</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>ITEM</th> <th>SYMBOL</th> <th>CONDITION</th> <th>MIN.</th> <th>TYP.</th> <th>MAX.</th> <th>UNIT</th> <th>REMARK</th> </tr> </thead> <tbody> <tr> <td rowspan="4">VIEWING ANGLE</td> <td>θ_{x+}</td> <td rowspan="4">CR ≥ 10</td> <td rowspan="4">$\theta_x=0^\circ$</td> <td>75</td> <td>80</td> <td>—</td> <td rowspan="4">deg. NOTE (2) NOTE (3)</td> </tr> <tr> <td>θ_{x-}</td> <td>75</td> <td>80</td> <td>—</td> </tr> <tr> <td>θ_{y+}</td> <td>75</td> <td>80</td> <td>—</td> </tr> <tr> <td>θ_{y-}</td> <td>75</td> <td>80</td> <td>—</td> </tr> <tr> <td>CONTRAST RATIO (CENTER)</td> <td>CR</td> <td>$\theta_x=0^\circ, \theta_y=0^\circ$</td> <td>600</td> <td>800</td> <td>—</td> <td>—</td> <td>NOTE (3)</td> </tr> <tr> <td>RESPONSE TIME</td> <td>TR(rise)+TF(fall)</td> <td>$\theta_x=0^\circ, \theta_y=0^\circ$</td> <td>—</td> <td>30</td> <td>35</td> <td>msec</td> <td>NOTE (4)</td> </tr> <tr> <td rowspan="8">COLOR CHROMATICITY (CENTER)</td> <td rowspan="2">WHITE</td> <td>Wx</td> <td rowspan="8">$\theta_x=0^\circ, \theta_y=0^\circ$ VDD-VSS=3.30V ILED = 44mA NTSC : 68%</td> <td>0.23</td> <td>0.28</td> <td>0.33</td> <td rowspan="8">—</td> <td rowspan="8">NOTE (5)</td> </tr> <tr> <td>Wy</td> <td>0.25</td> <td>0.30</td> <td>0.35</td> </tr> <tr> <td rowspan="2">RED</td> <td>Rx</td> <td>0.58</td> <td>0.63</td> <td>0.68</td> </tr> <tr> <td>Ry</td> <td>0.29</td> <td>0.34</td> <td>0.39</td> </tr> <tr> <td rowspan="2">GREEN</td> <td>Gx</td> <td>0.28</td> <td>0.33</td> <td>0.38</td> </tr> <tr> <td>Gy</td> <td>0.55</td> <td>0.60</td> <td>0.65</td> </tr> <tr> <td rowspan="2">BLUE</td> <td>Bx</td> <td>0.10</td> <td>0.15</td> <td>0.20</td> </tr> <tr> <td>By</td> <td>0.02</td> <td>0.07</td> <td>0.12</td> </tr> <tr> <td>THE BRIGHTNESS OF MODULE (CENTER)</td> <td>B</td> <td></td> <td>480</td> <td>530</td> <td>—</td> <td>cd/m²</td> <td>NOTE (6)</td> </tr> </tbody> </table>	ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK	VIEWING ANGLE	θ_{x+}	CR ≥ 10	$\theta_x=0^\circ$	(75)	(80)	—	deg. NOTE (2) NOTE (3)	θ_{x-}	(75)	(80)	—	θ_{y+}	(75)	(80)	—	θ_{y-}	(75)	(80)	—	CONTRAST RATIO (CENTER)	CR	$\theta_x=0^\circ, \theta_y=0^\circ$	(600)	(800)	—	—	NOTE (3)	RESPONSE TIME	TR(rise)+TF(fall)	$\theta_x=0^\circ, \theta_y=0^\circ$	—	(30)	(35)	msec	NOTE (4)	COLOR CHROMATICITY (CENTER)	WHITE	Wx	$\theta_x=0^\circ, \theta_y=0^\circ$ VDD-VSS=3.30V ILED = 44mA (NTSC : 70%)	(0.22)	(0.27)	(0.32)	—	NOTE (5)	Wy	(0.23)	(0.28)	(0.33)	RED	Rx	(0.58)	(0.63)	(0.68)	Ry	(0.29)	(0.34)	(0.39)	GREEN	Gx	(0.27)	(0.32)	(0.37)	Gy	(0.58)	(0.63)	(0.68)	BLUE	Bx	(0.10)	(0.15)	(0.20)	By	(0.02)	(0.07)	(0.12)	THE BRIGHTNESS OF MODULE (CENTER)	B		(480)	(530)	—	cd/m ²	NOTE (6)	ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK	VIEWING ANGLE	θ_{x+}	CR ≥ 10	$\theta_x=0^\circ$	75	80	—	deg. NOTE (2) NOTE (3)	θ_{x-}	75	80	—	θ_{y+}	75	80	—	θ_{y-}	75	80	—	CONTRAST RATIO (CENTER)	CR	$\theta_x=0^\circ, \theta_y=0^\circ$	600	800	—	—	NOTE (3)	RESPONSE TIME	TR(rise)+TF(fall)	$\theta_x=0^\circ, \theta_y=0^\circ$	—	30	35	msec	NOTE (4)	COLOR CHROMATICITY (CENTER)	WHITE	Wx	$\theta_x=0^\circ, \theta_y=0^\circ$ VDD-VSS=3.30V ILED = 44mA NTSC : 68%	0.23	0.28	0.33	—	NOTE (5)	Wy	0.25	0.30	0.35	RED	Rx	0.58	0.63	0.68	Ry	0.29	0.34	0.39	GREEN	Gx	0.28	0.33	0.38	Gy	0.55	0.60	0.65	BLUE	Bx	0.10	0.15	0.20	By	0.02	0.07	0.12	THE BRIGHTNESS OF MODULE (CENTER)	B		480	530	—	cd/m ²	NOTE (6)
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK																																																																																																																																																																																		
VIEWING ANGLE	θ_{x+}	CR ≥ 10	$\theta_x=0^\circ$	(75)	(80)	—	deg. NOTE (2) NOTE (3)																																																																																																																																																																																		
	θ_{x-}			(75)	(80)	—																																																																																																																																																																																			
	θ_{y+}			(75)	(80)	—																																																																																																																																																																																			
	θ_{y-}			(75)	(80)	—																																																																																																																																																																																			
CONTRAST RATIO (CENTER)	CR	$\theta_x=0^\circ, \theta_y=0^\circ$	(600)	(800)	—	—	NOTE (3)																																																																																																																																																																																		
RESPONSE TIME	TR(rise)+TF(fall)	$\theta_x=0^\circ, \theta_y=0^\circ$	—	(30)	(35)	msec	NOTE (4)																																																																																																																																																																																		
COLOR CHROMATICITY (CENTER)	WHITE	Wx	$\theta_x=0^\circ, \theta_y=0^\circ$ VDD-VSS=3.30V ILED = 44mA (NTSC : 70%)	(0.22)	(0.27)	(0.32)	—	NOTE (5)																																																																																																																																																																																	
		Wy		(0.23)	(0.28)	(0.33)																																																																																																																																																																																			
	RED	Rx		(0.58)	(0.63)	(0.68)																																																																																																																																																																																			
		Ry		(0.29)	(0.34)	(0.39)																																																																																																																																																																																			
	GREEN	Gx		(0.27)	(0.32)	(0.37)																																																																																																																																																																																			
		Gy		(0.58)	(0.63)	(0.68)																																																																																																																																																																																			
	BLUE	Bx		(0.10)	(0.15)	(0.20)																																																																																																																																																																																			
		By		(0.02)	(0.07)	(0.12)																																																																																																																																																																																			
THE BRIGHTNESS OF MODULE (CENTER)	B		(480)	(530)	—	cd/m ²	NOTE (6)																																																																																																																																																																																		
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK																																																																																																																																																																																		
VIEWING ANGLE	θ_{x+}	CR ≥ 10	$\theta_x=0^\circ$	75	80	—	deg. NOTE (2) NOTE (3)																																																																																																																																																																																		
	θ_{x-}			75	80	—																																																																																																																																																																																			
	θ_{y+}			75	80	—																																																																																																																																																																																			
	θ_{y-}			75	80	—																																																																																																																																																																																			
CONTRAST RATIO (CENTER)	CR	$\theta_x=0^\circ, \theta_y=0^\circ$	600	800	—	—	NOTE (3)																																																																																																																																																																																		
RESPONSE TIME	TR(rise)+TF(fall)	$\theta_x=0^\circ, \theta_y=0^\circ$	—	30	35	msec	NOTE (4)																																																																																																																																																																																		
COLOR CHROMATICITY (CENTER)	WHITE	Wx	$\theta_x=0^\circ, \theta_y=0^\circ$ VDD-VSS=3.30V ILED = 44mA NTSC : 68%	0.23	0.28	0.33	—	NOTE (5)																																																																																																																																																																																	
		Wy		0.25	0.30	0.35																																																																																																																																																																																			
	RED	Rx		0.58	0.63	0.68																																																																																																																																																																																			
		Ry		0.29	0.34	0.39																																																																																																																																																																																			
	GREEN	Gx		0.28	0.33	0.38																																																																																																																																																																																			
		Gy		0.55	0.60	0.65																																																																																																																																																																																			
	BLUE	Bx		0.10	0.15	0.20																																																																																																																																																																																			
		By		0.02	0.07	0.12																																																																																																																																																																																			
THE BRIGHTNESS OF MODULE (CENTER)	B		480	530	—	cd/m ²	NOTE (6)																																																																																																																																																																																		



27	<p>12.3.2 MODULE DEFECTS CLASSIFICATION NO.3, DOT DEFECT→PIXEL DEFECT: CRITERIA: DOT→PIXEL, DOTS→PIXELS</p>
----	--

TABLE OF CONTENTS

NO.	ITEM	PAGE
1.	GENERAL SPECIFICATIONS -----	1
2.	MECHANICAL SPECIFICATIONS -----	1
3.	ABSOLUTE MAXIMUM RATINGS -----	2
4.	ELECTRICAL CHARACTERISTICS -----	3
5.	TIMING CHARACTERISTICS -----	4 ~ 17
6.	OPTICAL CHARACTERISTICS -----	18 , 19
7.	OUTLINE DIMENSIONS -----	20
8.	BLOCK DIAGRAM -----	21
9.	DETAIL DRAWING OF DOT MATRIX -----	22
10.	INTERFACE SIGNALS -----	23
11.	POWER SUPPLY -----	24
12.	INSPECTION CRITERIA -----	25 ~ 31
13.	RELIABILITY TEST -----	32
14.	CAUTION -----	33 , 34

CONFIDENTIAL
Authorized for
Emerging Display Technologies Corporation Only.
Do not distribute without authorization.

1. GENERAL SPECIFICATIONS

1.1 DATA SHEETS FOR CONTROLLER/DRIVER

PLEASE REFER TO :

ILITEK ILI9881D

1.2 MATERIAL SAFETY DESCRIPTION

ASSEMBLIES SHALL COMPLY WITH EUROPEAN ROHS REQUIREMENTS, INCLUDING PROHIBITED MATERIALS/COMPONENTS CONTAINING LEAD, MERCURY, CADMIUM, HEXAVALENT CHROMIUM, POLYBROMINATED BIPHENYLS (PBB) AND POLYBROMINATED DIPHENYL ETHERS (PBDE), BIS(2-ETHYLHEXYL) PHTHALATE (DEHP), BUTYL BENZYL PHTHALATE (BBP), DIBUTYL PHTHALATE (DBP), DIISOBUTYL PHTHALATE (DIBP).

2. MECHANICAL SPECIFICATIONS

(1) DIAGONALS	-----	5.0 inch
(2) NUMBER OF DOTS	-----	720W * (RGB) * 1280H DOTS
(3) MODULE SIZE	-----	66.1W * 119.55H * 2.26D mm (WITHOUT FPC)
(4) VIEWING AREA	-----	64.1W * 113.29H mm
(5) ACTIVE AREA	-----	62.1W * 110.4H mm
(6) DOT SIZE	-----	0.02875W * 0.08625H mm
(7) PIXEL SIZE	-----	0.08625W * 0.08625H mm
(8) LCD TYPE	-----	TFT, TRANSMISSIVE, NORMALLY BLACK
(9) COLOR	-----	16.7M
(10) VIEWING DIRECTION	-----	SUPER WIDE VIEW
(11) BACK LIGHT	-----	LED, COLOR : WHITE
(12) INTERFACE MODE	-----	MIPI

3. ABSOLUTE MAXIMUM RATINGS

3.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
POWER SUPPLY VOLTAGE	VDD-VSS	-0.3	6.6	V	

NOTE (1) : LCM SHOULD BE GROUNDED DURING LCM HANDLING.

3.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE		REMARK
	MIN.	MAX.	MIN.	MAX.	
AMBIENT TEMPERATURE	-20°C	70°C	-30°C	80°C	NOTE (1), (2), (3)
HUMIDITY	NOTE (3)		NOTE (3)		WITHOUT CONDENSATION
VIBRATION	—	2.45 m/s ² (0.25 G)	—	11.76 m/s ² (1.2 G)	10~100 Hz XYZ DIRECTIONS 1 HR EACH
SHOCK	—	29.4 m/s ² (3 G)	—	490 m/s ² (50 G)	10ms XYZ DIRECTIONS 1 TIME EACH
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		

NOTE (1) : THE ABSOLUTE MAXIMUM RATINGS OF THIS PRODUCT SHOULD NOT BE EXCEEDED AT ANY TIME. IF THESE RATINGS ARE EXCEEDED, THE PRODUCT'S PERFORMANCE IS NOT GUARANTEED AND THE PRODUCT MAY EXPERIENCE PERMANENT DAMAGE.

NOTE (2) : BACKGROUND COLOR CHANGES SLIGHTLY DEPENDING ON AMBIENT TEMPERATURE THIS PHENOMENON IS REVERSIBLE .

NOTE (3) : Ta ≤ 60°C : 90%RH MAX (96HRS MAX).

Ta > 60°C : ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY OF 90%RH AT 60°C(96HRS MAX).

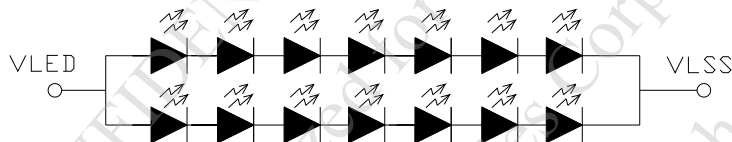
4. ELECTRICAL CHARACTERISTICS

Ta=25°C

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
POWER SUPPLY VOLTAGE	VDD-VSS	—	3.15	3.3	3.45	V	
LOGIC HIGH INPUT VOLTAGE	VIH	IOVCC =1.8V±5%	1.2	—	IOVCC	V	
LOGIC LOW INPUT VOLTAGE	VIL		-0.3	—	0.57	V	
POWER SUPPLY CURRENT	IDD	—	—	58	75	mA	NOTE (1)
POWER SUPPLY VOLTAGE FOR LED BACKLIGHT	VLED-VLSS	I _{LED} =44mA	18.55	21	23.45	V	NOTE (2)
LED LIFE TIME	—	I _F =22mA (PER LED)	30K	—	—	HRS	NOTE (4) NOTE (5)

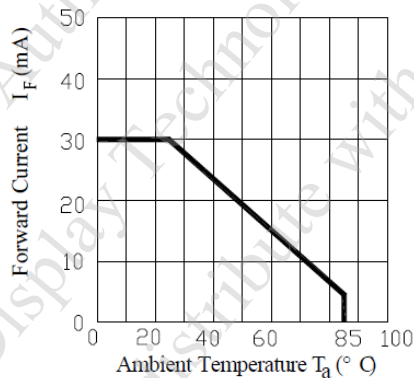
NOTE (1) : THE DISPLAY PATTERN IS ALL “WHITE”.

NOTE (2) : INTERNAL CIRCUIT DIAGRAM OF BACKLIGHT



NOTE (3) : AMBIENT TEMP. VS. ALLOWABLE FORWARD CURRENT.(PER LED)

Forward Current Derating Curve



NOTE (4) : CONDITIONS; Ta=25 °C, CONTINUOUS LIGHTING.

NOTE (5) : DEFINITIONS OF LIFE TIME :

LCM LUMINANCE BECOMES HALF OF THE INITIAL VALUE.

5. TIMING CHARACTERISTICS

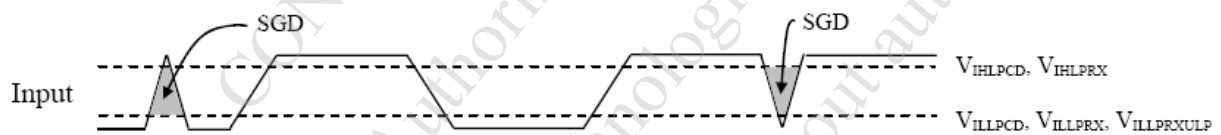
5.1 DSI DC CHARACTERISTICS FOR TFT MODULE

5.1.1 DC CHARACTERISTICS FOR DSI LP MODE

ITEM	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
LOGIC 1 INPUT VOLTAGE	V_{IHLPCD}	LP-CD	450	—	1350	mV
LOGIC 0 INPUT VOLTAGE	V_{ILLPCD}	LP-CD	0.0	—	200	mV
LOGIC 1 INPUT VOLTAGE	V_{IHLPRX}	LP-RX (CLK, D0, D1, D2, D3)	880	—	1350	mV
LOGIC 0 INPUT VOLTAGE	V_{ILLPRX}	LP-RX (CLK, D0, D1, D2, D3)	0.0	—	550	mV
LOGIC 0 INPUT VOLTAGE	$V_{ILLPRXULP}$	LP-RX (CLK ULP mode)	0.0	—	300	mV
LOGIC 1 OUTPUT VOLTAGE	V_{OHLPTX}	LP-TX (D0)	1.1	—	1.3	V
LOGIC 0 OUTPUT VOLTAGE	V_{OLLPTX}	LP-TX (D0)	-50	—	50	mV
LOGIC 1 INPUT CURRENT	I_{IH}	LP-CD, LP-RX	-	—	10	uA
LOGIC 0 INPUT CURRENT	I_{IL}	LP-CD, LP-RX	-10	—	—	uA

NOTE (1) : DSI HIGH SPEED MODE IS OFF.

5.1.2 SPIKE/GLITCH REJECTION



NOTE (1) : A SPIKE/GLITCH CAN BE REJECTED WHEN THE PEAK INTERFERENCE AMPLITUDE IS 200mV (AT MAXIMUM) AND INTERFERENCE FREQUENCY IS 450MHz (AT THE VERY LEAST).

NOTE (2) : N = 0,1,2,3

SPIKE/GLITCH REJECTION – DSI					
SIGNAL	SYMBOL	PARAMETER	MIN.	MAX.	UNIT
CLKP/N, DnP/N	SGD	INPUT PULSE REJECTION FOR DSI	—	300	Vps

5.1.3 DC CHARACTERISTICS FOR DSI HS MODE

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
INPUT COMMON MODE VOLTAGE FOR CLOCK	V_{CMCLK}	CLKP/N NOTE (2), (3)	70	—	330	mV
INPUT COMMON MODE VOLTAGE FOR DATA	V_{CMDATA}	DnP/N NOTE (2), (3), (5)	70	—	330	mV
COMMON MODE RIPPLE FOR CLOCK EQUAL OR LESS THAN 450MHz	$V_{CMRCLKL450}$	CLKP/N NOTE (4)	-50	—	50	mV
COMMON MODE RIPPLE FOR DATA EQUAL OR LESS THAN 450MHz	$V_{CMRDATAL450}$	DnP/N NOTE (4), (5)	-50	—	50	mV
COMMON MODE RIPPLE FOR CLOCK MORE THAN 450MHz (PEAK SINE WAVE)	$V_{CMRCLKM450}$	CLKP/N	—	—	100	mV
COMMON MODE RIPPLE FOR DATA MORE THAN 450MHz (PEAK SINE WAVE)	$V_{CMRDATAM450}$	DnP/N NOTE (5)	—	—	100	mV
DIFFERENTIAL INPUT LOW LEVEL THRESHOLD VOLTAGE FOR CLOCK	$V_{THLCLK-}$	CLKP/N	-70	—	—	mV
DIFFERENTIAL INPUT LOW LEVEL THRESHOLD VOLTAGE FOR DATA	$V_{THLDATA-}$	DnP/N NOTE (5)	-70	—	—	mV
DIFFERENTIAL INPUT HIGH LEVEL THRESHOLD VOLTAGE FOR CLOCK	$V_{THHCLK+}$	CLKP/N	—	—	70	mV
DIFFERENTIAL INPUT HIGH LEVEL THRESHOLD VOLTAGE FOR DATA	$V_{THHDATA+}$	DnP/N NOTE (5)	—	—	70	mV
SINGLE-ENDED INPUT LOW VOLTAGE	V_{ILHS}	CLKP/N, DnP/N NOTE (3), (5)	-40	—	—	mV
SINGLE-ENDED INPUT HIGH VOLTAGE	V_{IHHS}	CLKP/N, DnP/N NOTE (3), (5)	—	—	460	mV
DIFFERENTIAL TERMINATION RESISTOR	R_{TERM}	CLKP/N, DnP/N NOTE (5)	80	100	125	Ω
SINGLE-ENDED THRESHOLD VOLTAGE FOR TERMINATION ENABLE	$V_{TERM-EN}$	CLKP/N, DnP/N NOTE (5)	—	—	450	mV
TERMINATION CAPACITOR	C_{TERM}	CLKP/N, DnP/N NOTE (5), (6)	—	—	60	pF

NOTE (1) : VDD=3.3V

NOTE (2) : INCLUDES 50mV (-50mV TO 50mV) GROUND DIFFERENCE

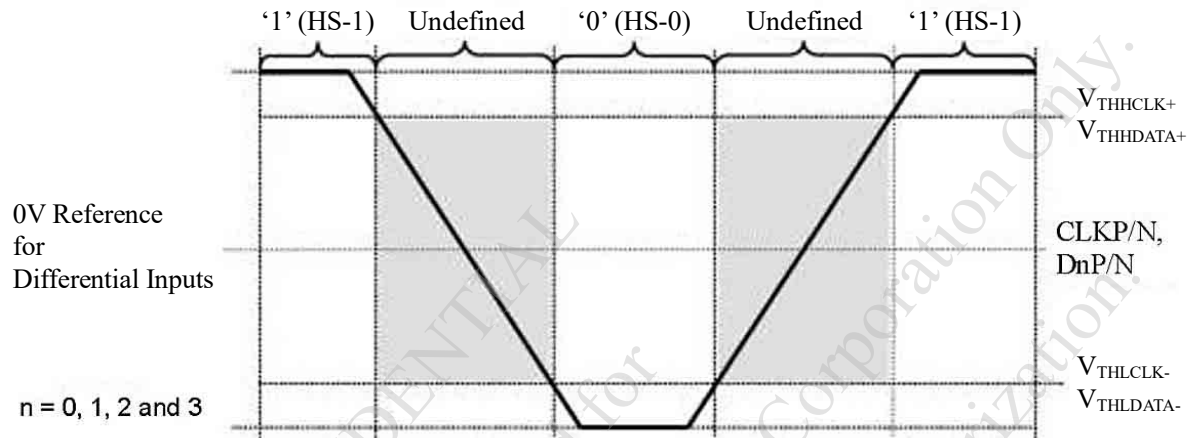
NOTE (3) : WITHOUT $V_{CMRCLKM450}/V_{CMRDATAM450}$

NOTE (4) : WITHOUT 50mV (-50mV TO 50mV) GROUND DIFFERENCE

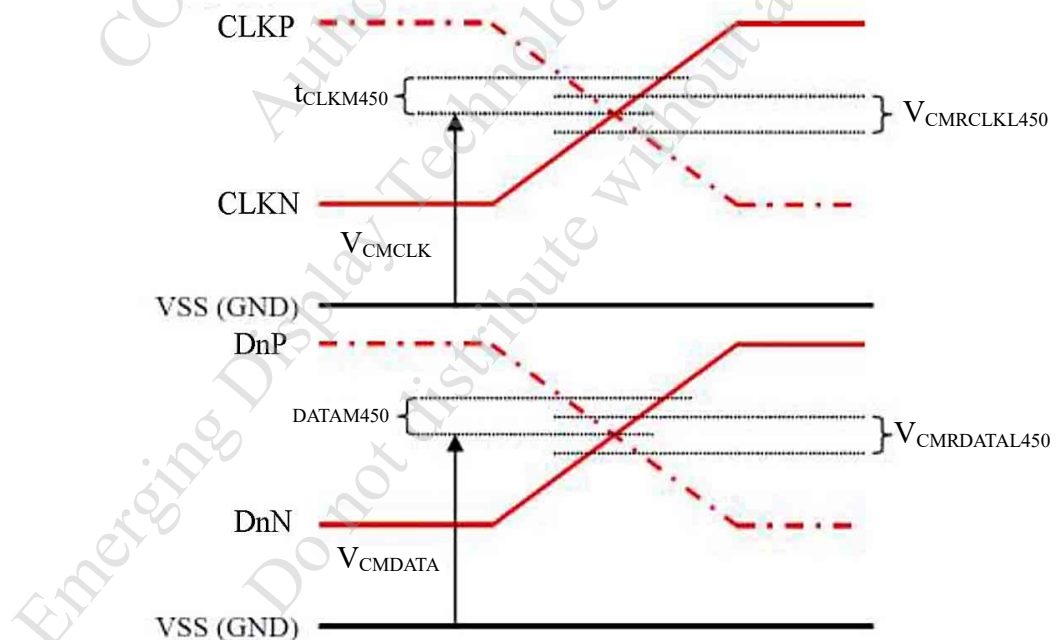
NOTE (5) : N = 0,1,2,3

NOTE (6) : FOR HIGHER BIT RATES, A 14pF CAPACITOR WILL BE NEEDED TO MEET THE COMMON-MODE RETURN LOSS SPECIFICATION.

THE DSI RECEIVER (HS MODE) UNDERSTANDS THAT THERE IS LOGICAL 1 (= HS-1) WHEN A DIFFERENTIAL VOLTAGE IS MORE THAN V_{THH} (CLKP/DnP). THE DSI RECEIVER (HS MODE) UNDERSTANDS THAT THERE IS LOGICAL 0 (= HS-0) WHEN A DIFFERENTIAL VOLTAGE IS MORE THAN V_{THL} (CLKN/DnN). THERE IS UNDEFINED STATE IF THE DIFFERENTIAL VOLTAGE IS LESS THAN V_{THH} (CLKP/DnP) AND LESS THAN V_{THL} (CLKN/DnN). A REFERENCE FIGURE IS BELOW.



DIFFERENTIAL INPUTS LOGICAL 0 AND 1, THRESHOLD HIGH/LOW, DIFFERENTIAL VOLTAGE RANGE

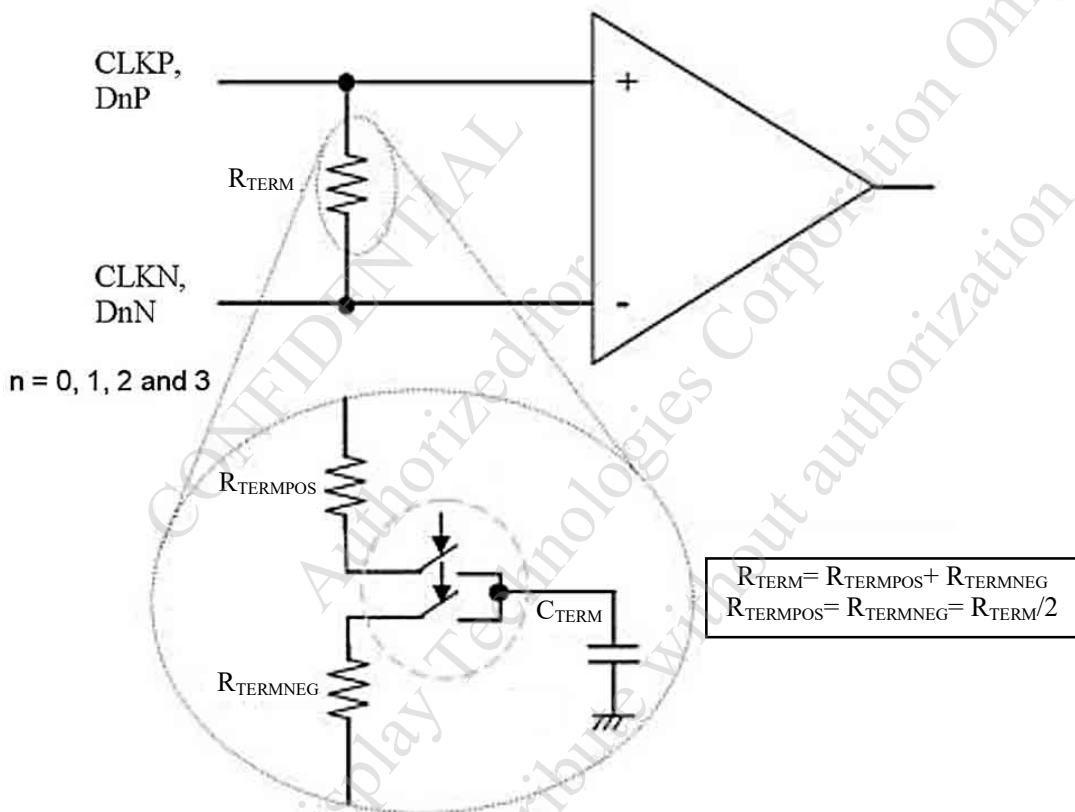


NOTE: n = 0, 1, 2 AND 3

COMMON MODE VOLTAGE ON CLOCK AND DATA CHANNELS

THE TERMINATION RESISTOR (R_{TERM}) OF THE DIFFERENTIAL DSI RECEIVER CAN BE DRIVEN TO TWO DIFFERENT STATES BY THE RECEIVER:

- (1) LOW POWER (LP) MODE WHEN THE TERMINATION RESISTOR IS NOT CONNECTED BETWEEN DIFFERENTIAL INPUTS (CLKP \Leftrightarrow CLKN OR D0P \Leftrightarrow D0N OR D1P \Leftrightarrow D2N OR D2P \Leftrightarrow D3N OR D1P \Leftrightarrow D3N)
- (2) HIGH SPEED (HS) MODE WHEN THE TERMINATION RESISTOR IS CONNECTED BETWEEN DIFFERENTIAL INPUTS (CLKP \Leftrightarrow CLKN OR D0P \Leftrightarrow D0N OR D1P \Leftrightarrow D2N OR D2P \Leftrightarrow D3N OR D1P \Leftrightarrow D3N)

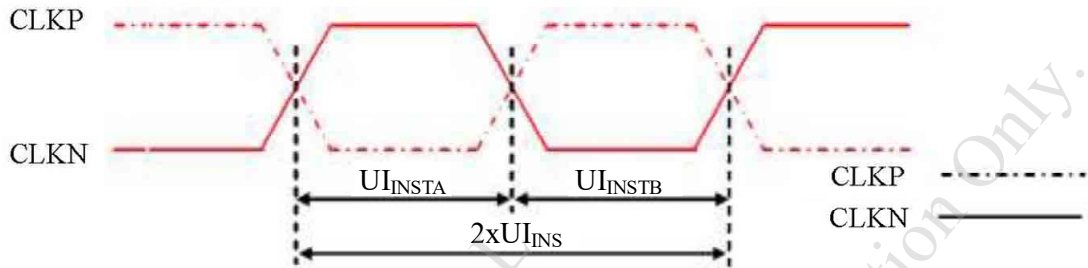


DIFFERENTIAL PAIR TERMINATION RESISTOR ON THE RECEIVER SIDE

5.2 AC CHARACTERISTICS FOR TFT MODULE

5.2.1 DSI TIMING CHARACTERISTICS

5.2.2 HIGH SPEED MODE – CLOCK CHANNEL TIMING



SIGNAL	SYMBOL	PARAMETER	MIN.	MAX.	UNIT
CLKP/N	$2xUI_{INST}$	DOUBLE UI INSTANTANEOUS	NOTE (2)	25	ns
CLKP/N	UI_{INSTA}, UI_{INSTB} NOTE (1)	UI INSTANTANEOUS HALF	NOTE (2)	12.5	ns

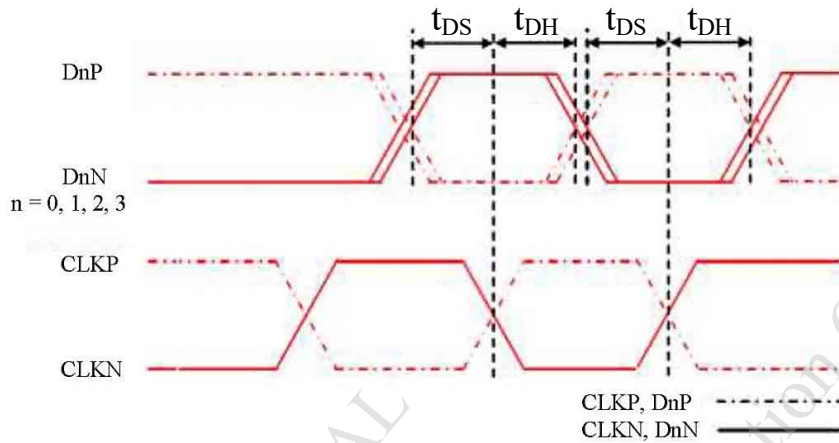
NOTE (1) : $UI = UI_{INSTA} = UI_{INSTB}$

NOTE (2) : DEFINE THE MINIMUM VALUE OF 24 UI PER PIXEL.

DATA TYPE	TWO LANES SPEED	THREE LANES SPEED	FOUR LANES SPEED
DATA TYPE = 00 1110 (0Eh), RGB 565, 16 UI PER PIXEL	566 Mbps	466 Mbps	366 Mbps
DATA TYPE = 01 1110 (1Eh), RGB 666, 18 UI PER PIXEL	637 Mbps	525 Mbps	412 Mbps
DATA TYPE = 10 1110 (2Eh), RGB 666 LOOSELY, 24 UI PER PIXEL	850 Mbps	700 Mbps	550 Mbps
DATA TYPE = 11 1110 (3Eh), RGB 888, 24 UI PER PIXEL	850 Mbps	700 Mbps	550 Mbps

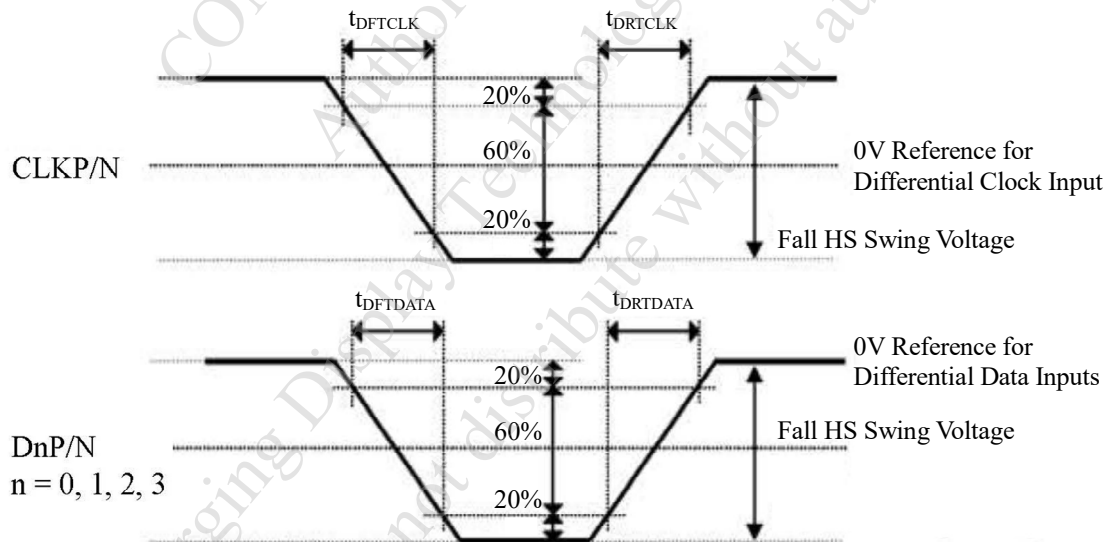
LIMITED CLOCK CHANNEL SPEED

5.2.3 HIGH SPEED MODE – DATA CLOCK CHANNEL TIMING



SIGNAL	SYMBOL	PARAMETER	MIN.	MAX.
DnP/N , n=0,1,2,3	t_{DS}	DATA TO CLOCK SETUP TIME	0.15xUI	—
	t_{DH}	CLOCK TO DATA HOLD TIME	0.15xUI	—

5.2.4 HIGH SPEED MODE – RISING AND FALLING TIMINGS

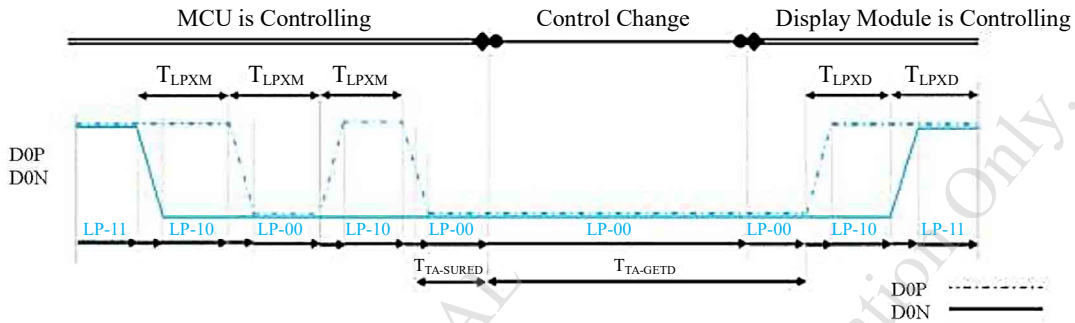


ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.
DIFFERENTIAL RISE TIME FOR CLOCK	t_{DRTCLK}	CLKP/N	150 ps	—	0.3UI NOTE (1)
DIFFERENTIAL RISE TIME FOR DATA	$t_{DRTDATA}$	DnP/N n=0,1,2,3	150 ps	—	0.3UI NOTE (1)
DIFFERENTIAL FALL TIME FOR CLOCK	t_{DFTCLK}	CLKP/N	150 ps	—	0.3UI NOTE (1)
DIFFERENTIAL FALL TIME FOR DATA	$t_{DFTDATA}$	DnP/N n=0,1,2,3	150 ps	—	0.3UI NOTE (1)

NOTE (1) : THE DISPLAY MODULE HAS TO MEET TIMING REQUIREMENTS, WHICH ARE DEFINED FOR THE TRANSMITTER (MCU) ON MIPI D-PHY STANDARD.

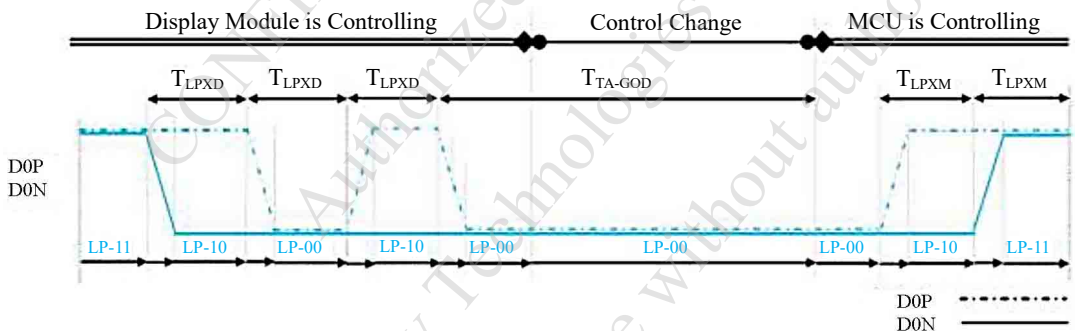
5.2.5 LOW SPEED MODE – BUS TURN AROUND

LOWER POWER MODE AND ITS STATE PERIODS ON THE BUS TURNAROUND (BTA) FROM THE MCU TO THE DISPLAY MODULE (ILI9881D) ARE ILLUSTRATED FOR REFERENCE PURPOSES BELOW.



BTA FROM THE MCU TO THE DISPLAY MODULE

LOWER POWER MODE AND ITS STATE PERIODS ON THE BUS TURNAROUND (BTA) FROM THE DISPLAY MODULE (ILI9881D) TO THE MCU ARE ILLUSTRATED FOR REFERENCE PURPOSES BELOW.



BTA FROM THE DISPLAY MODULE TO THE MCU

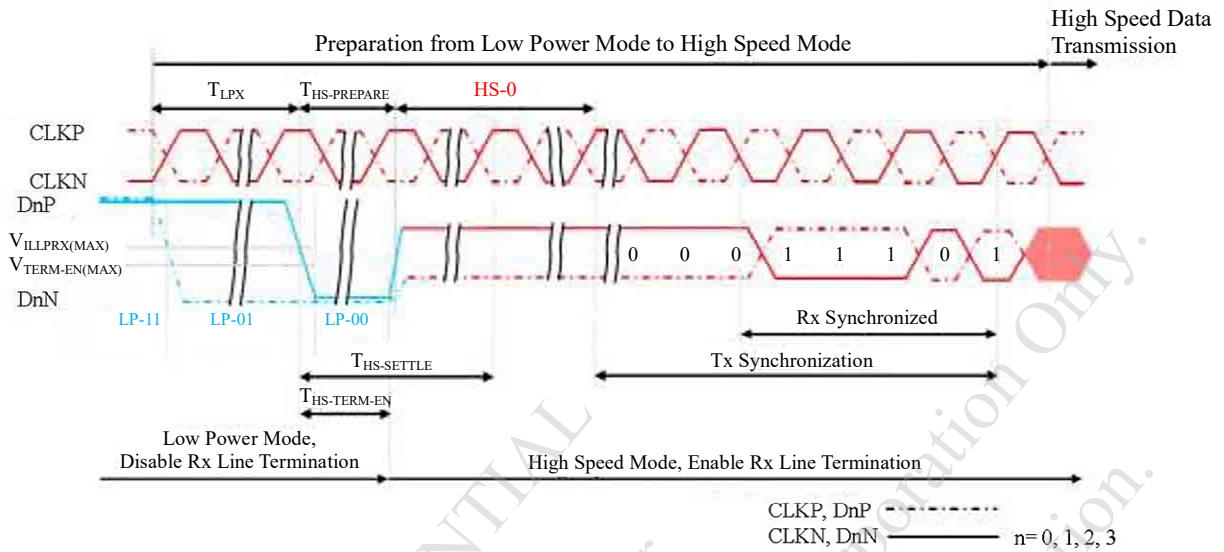
SIGNAL	SYMBOL	DESCRIPTION	MIN.	MAX.	UNIT
D0P/N	T_{LPXM}	LENGTH OF LP-00, LP-01, LP-10 OR LP-11 PERIODS MCU → DISPLAY MODULE (ILI9881D)	50	75	ns
D0P/N	T_{LPXD}	LENGTH OF LP-00, LP-01, LP-10 OR LP-11 PERIODS DISPLAY MODULE (ILI9881D) → MCU	50	75	ns
D0P/N	$T_{TA-SURED}$	TIME-OUT BEFORE THE DISPLAY MODULE (ILI9881D) STARTS DRIVING	T_{LPXD}	$2 \times T_{LPXD}$	n

LOW POWER STATE PERIOD TIMINGS – A

SIGNAL	SYMBOL	DESCRIPTION	TIME	UNIT
D0P/N	$T_{TA-GETD}$	TIME TO DRIVE LP-00 BY DISPLAY MODULE (ILI9881D)	$5 \times T_{LPXD}$	ns
D0P/N	T_{TA-GOD}	TIME TO DRIVE LP-00 AFTER TURNAROUND REQUEST - MCU	$4 \times T_{LPXD}$	ns

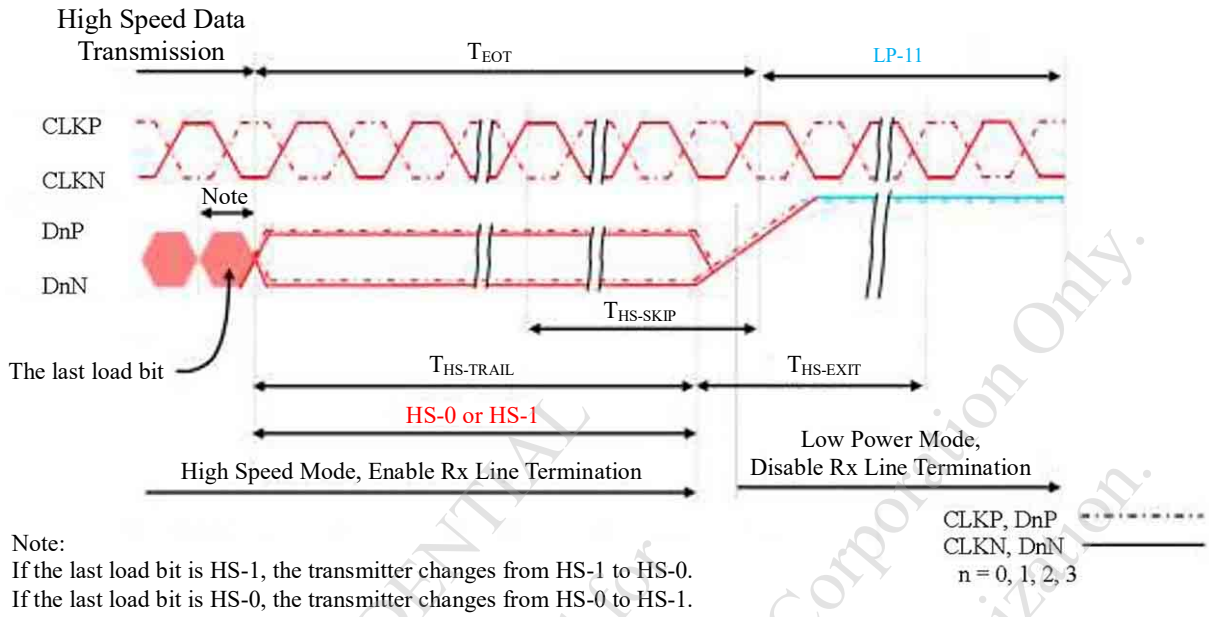
LOW POWER STATE PERIOD TIMINGS – B

5.2.6 DATA LANES FROM LOW POWER MODE TO HIGH SPEED MODE



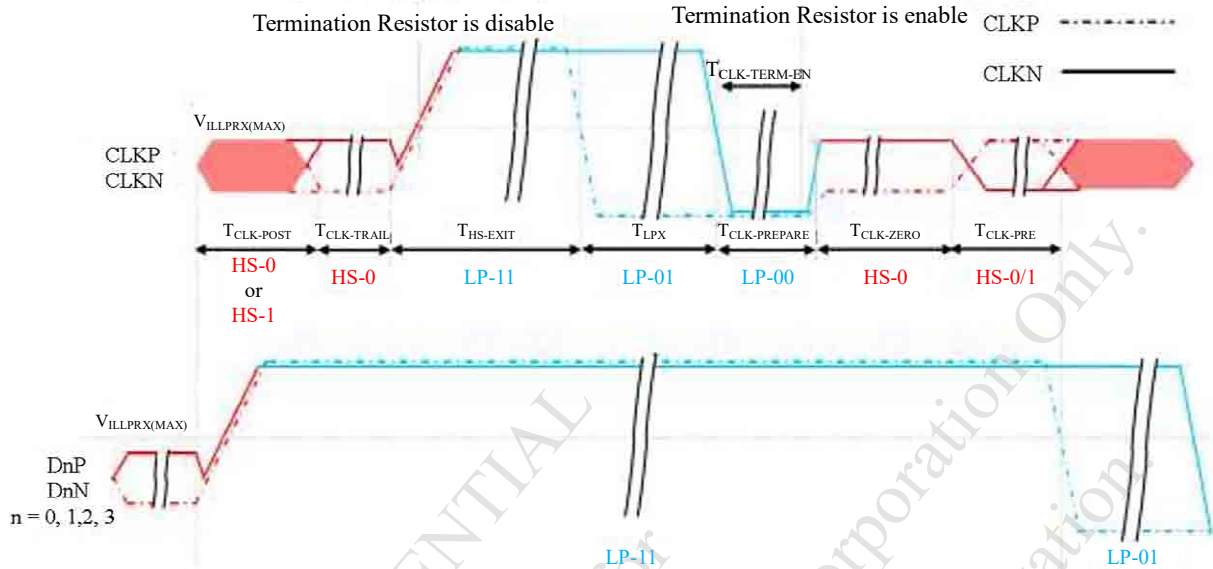
SIGNAL	SYMBOL	DESCRIPTION	MIN.	MAX.	UNIT
DnP/N, n = 0,1,2,3	T_{LPX}	LENGTH OF ANY LOW POWER STATE PERIOD	50	—	ns
DnP/N, n = 0,1,2,3	$T_{HS-PREPARE}$	TIME TO DRIVE LP-00 TO PREPARE FOR HS TRANSMISSION	$40+4xUI$	$85+6xUI$	ns
DnP/N, n = 0,1,2,3	$T_{HS-TERM-EN}$	TIME TO ENABLE DATA LANE RECEIVER LINE TERMINATION MEASURED FROM WHEN DN CROSSES VILMAX	—	$35+4xUI$	ns

5.2.7 DATA LANES FROM HIGH SPEED MODE TO LOW POWER MODE



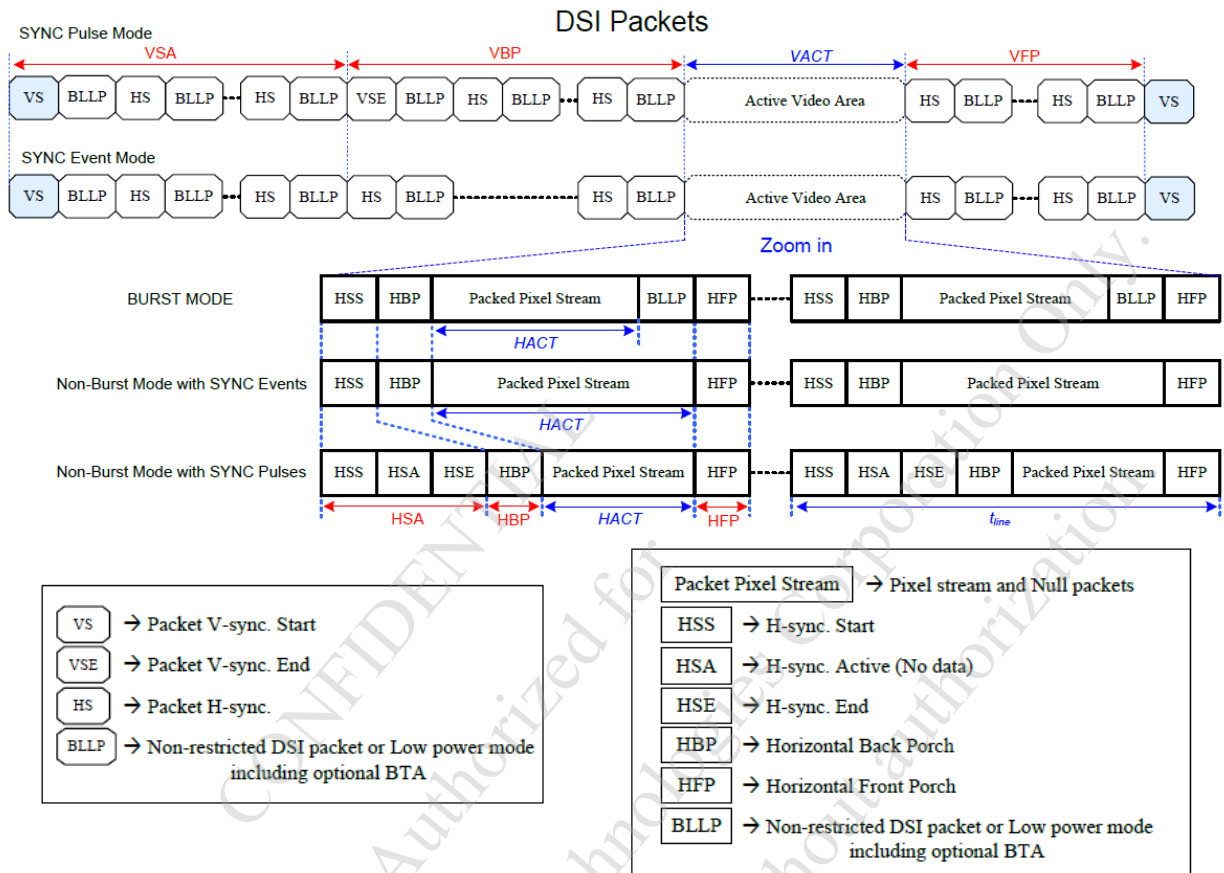
SIGNAL	SYMBOL	DESCRIPTION	MIN.	MAX.	UNIT
DnP/N, n = 0,1,2,3	T _{HS-SKIP}	TIME-OUT AT DISPLAY MODULE (ILI9881D) TO IGNORE TRANSITION PERIOD OF EOT	40	55+4xUI	ns
DnP/N, n = 0,1,2,3	T _{HS-EXIT}	TIME TO DRIVER LP-11 AFTER HS BURST	100	—	ns

5.2.8 DATA LANES FROM HIGH SPEED MODE TO LOW POWER MODE



SIGNAL	SYMBOL	DESCRIPTION	MIN.	MAX.	UNIT
CLKP/N	$T_{CLK-POST}$	TIME THAT THE MCU SHALL CONTINUE SENDING HS CLOCK AFTER THE LAST ASSOCIATED DATA LANES HAS TRANSITIONED TO LP MODE	$60+52xUI$	—	ns
CLKP/N	$T_{CLK-TRAIL}$	TIME TO DRIVE HS DIFFERENTIAL STATE AFTER LAST PAYLOAD CLOCK BIT OF A HS TRANSMISSION BURST	60	—	ns
CLKP/N	$T_{HS-EXIT}$	TIME TO DRIVE LP-11 AFTER HS BURST	100	—	ns
CLKP/N	$T_{CLK-PREPARE}$	TIME TO DRIVE LP-00 TO PREPARE FOR HS TRANSMISSION	38	95	ns
CLKP/N	$T_{CLK-TERM-EN}$	TIME-OUT AT CLOCK LANE TO ENABLE HS TERMINATION	—	38	ns
CLKP/N	$T_{CLK-PREPARE} + T_{CLK-ZERO}$	MINIMUM LEAD HS-0 DRIVE PERIOD BEFORE STARTING CLOCK	300	—	ns
CLKP/N	$T_{CLK-PRE}$	TIME THAT THE HS CLOCK SHALL BE DRIVEN PRIOR TO ANY ASSOCIATED DATA LANE BEGINNING THE TRANSITION FROM LP TO HS MODE	$8xUI$	—	ns

5.2.9 TIMING FOR DSI VIDEO MODE



ITEM	SYMBOLS	MIN.	TYP.	MAX.	UNITS
VERTICAL SYNC. ACTIVE	VSA	2 NOTE (5)	8	—	Line
VERTICAL BACK PORCH	VBP	14 NOTE (5)	24	—	Line
VERTICAL FRONT PORCH	VFP	8 NOTE (5)	16	—	Line
ACTIVE LINES PER FRAME	VACT	—	1280	—	Line
HORIZONTAL SYNC. ACTIVE	HSA	2	20	—	Pixel
HORIZONTAL PORCH PERIOD	HSA + HBP + HFP	1.6	2.67	—	us
ACTIVE PIXELS PER LINE	HACT	—	720	—	Pixel
BIT RATE	BRbps	385	450	NOTE (4)	Mbps/lane

1 UI=1/BIT RATE

$$HAS(PIXEL) = (tHSA * LANE NUMBER) / (UI * PIXEL FORMAT)$$

$$HBP(PIXEL) = (tHBP * LANE NUMBER) / (UI * PIXEL FORMAT)$$

$$HFP(PIXEL) = (tHFP * LANE NUMBER) / (UI * PIXEL FORMAT)$$

$$FRAME RATE = \frac{BR_{bps} \times Lane_{num}}{(VACT + VSA + VBP + VFP) \times (HACT + HSA + HBP + HFP) \times PIXEL FORMAT}$$

EXAMPLE : BRbps = 457Mbps/lane, 1UI=2.1883ns, FRAME RATE=60Hz, VACT=1280, VSA=2, VBP=30, VFP=20, HACT=720, HSA=33, HBP=100, HFP=100, Lane_{num}=4(lane), Pixel Format=24(bit).

NOTE (1) : Lane_{num}: DATE LANE OF MIPI-DSI.

NOTE (2) : THE FORMULA EXISTS SLIGHTLY ERROR BECAUSE OF THE HOST-TRANSMISSION WAY.

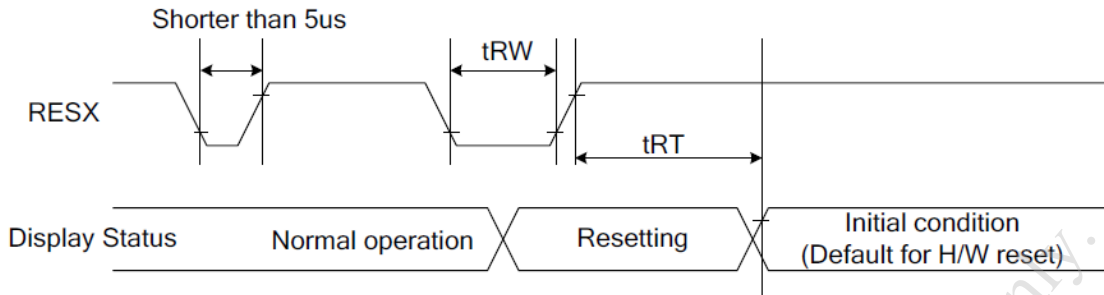
NOTE (3) : THE BEST FRAME RATE SETTING : 2 DATA LANES : 50~60 Hz /3 DATA LANES : 50~70 Hz
/4 DATA LANES : 50~70 Hz.

NOTE (4) : PLEASE REFERENCE TO "PAGE 9: LIMITED CLOCK CHANNEL SPEED".

NOTE (5) : THE MINIMUM VALUES OF THIS TABLE MEAN THE LIMITATION OF IC WITHOUT
CONSIDERING THE PANEL GIP. THE ACTUAL VALUES OF VSA, VBP AND VFP WILL BE
CHANGED BY DIFFERENT PANEL GIP SETTING.

CONFIDENTIAL
Authorized for
Emerging Display Technologies Corporation Only.
Do not distribute without authorization.

5.2.10 RESET TIMING



SIGNAL	SYMBOL	PARAMETER	MIN.	MAX.	UNIT
RESX	tRW	RESET PULSE DURATION	10	—	uS
	tRT	RESET CANCEL	—	5	mS
—			120	mS	
					NOTE (1), (6), (7)

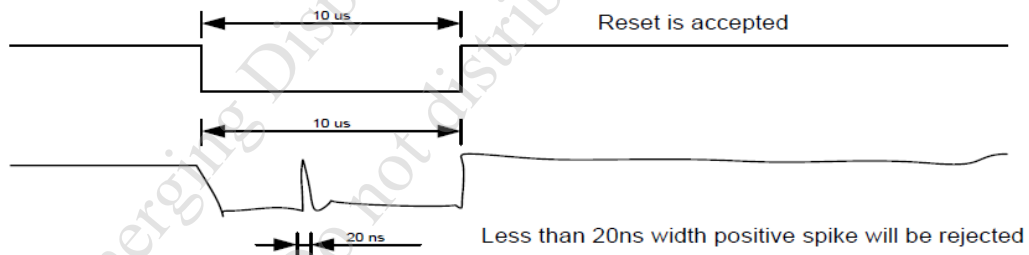
NOTE (1) : THE RESET CANCEL ALSO INCLUDES REQUIRED TIME FOR LOADING ID BYTES, VCOM SETTING AND OTHER SETTINGS FROM EEPROM TO REGISTERS. THIS LOADING IS DONE EVERY TIME WHEN THERE IS H/W RESET CANCEL TIME (TRT) WITHIN 5 ms AFTER A RISING EDGE OF RESX.

NOTE (2) : SPIKE DUE TO AN ELECTROSTATIC DISCHARGE ON RESX LINE DOES NOT CAUSE IRREGULAR SYSTEM RESET ACCORDING TO:

RESX PULSE	ACTION
SHORTER THAN 5us	RESET REJECTED
LONGER THAN 10us	RESET
BETWEEN 5us AND 10us	RESET STARTS

NOTE (3) : DURING THE RESETTING PERIOD, THE DISPLAY WILL BE BLANKED (THE DISPLAY ENTERS THE BLANKING SEQUENCE, WHICH MAXIMUM TIME IS 120 ms, WHEN RESET STARTS IN THE SLEEP OUT MODE. THE DISPLAY REMAINS THE BLANK STATE IN THE SLEEP IN MODE.) AND THEN RETURN TO DEFAULT CONDITION FOR HARDWARE RESET.

NOTE (4) : SPIKE REJECTION CAN ALSO BE APPLIED DURING A VALID RESET PULSE, AS SHOWN BELOW:

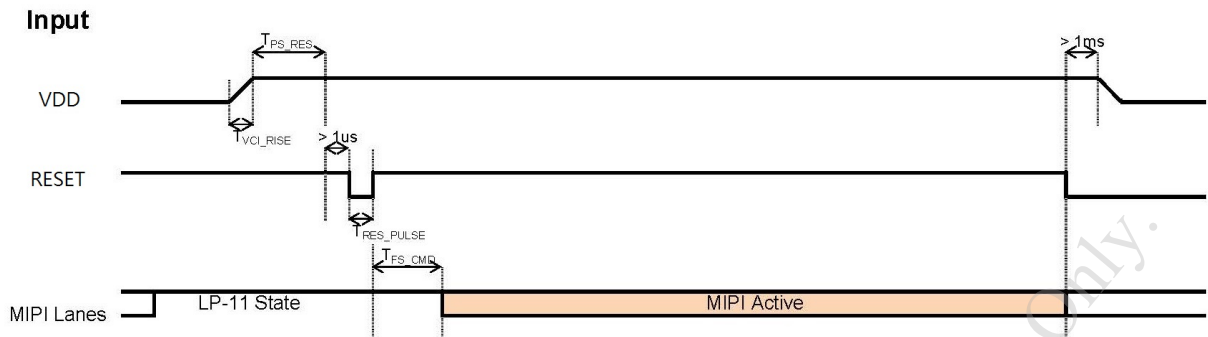


NOTE (5) : WHEN RESET APPLIED DURING SLEEP IN MODE.

NOTE (6) : WHEN RESET APPLIED DURING SLEEP OUT MODE.

NOTE (7) : IT IS NECESSARY TO WAIT 5MSEC AFTER RELEASING RESX BEFORE SENDING COMMANDS. ALSO SLEEP OUT COMMAND CANNOT BE SENT FOR 120MSEC.

5.2.11 POWER SEQUENCE



SYMBOL	CHARACTERISTICS	MIN.	TYP.	MAX.	UNITS
T_{VCI_RISE}	VCI RISE TIME	130	—	—	us
T_{PS_RES}	VDDI/VCI ON TO RESET HIGH	5	—	—	ms
T_{RES_PULSE}	RESET LOW PULSE TIME	10	—	—	us
T_{FS_CMD}	RESET TO FIRST COMMAND	10	—	—	ms

CONFIDENTIAL
 Authorized for
 Emerging Display Technologies Corporation Only.
 Do not distribute without authorization.

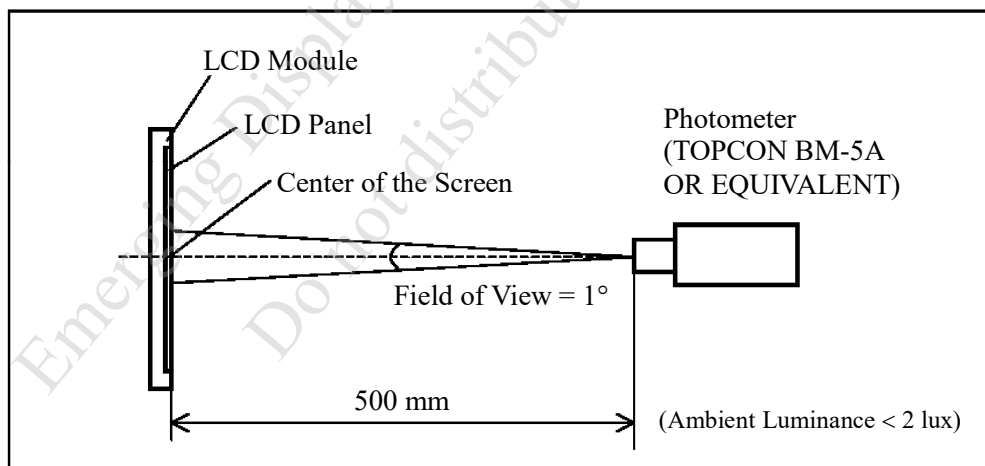
6. OPTICAL CHARACTERISTICS

Ta=25±2°C

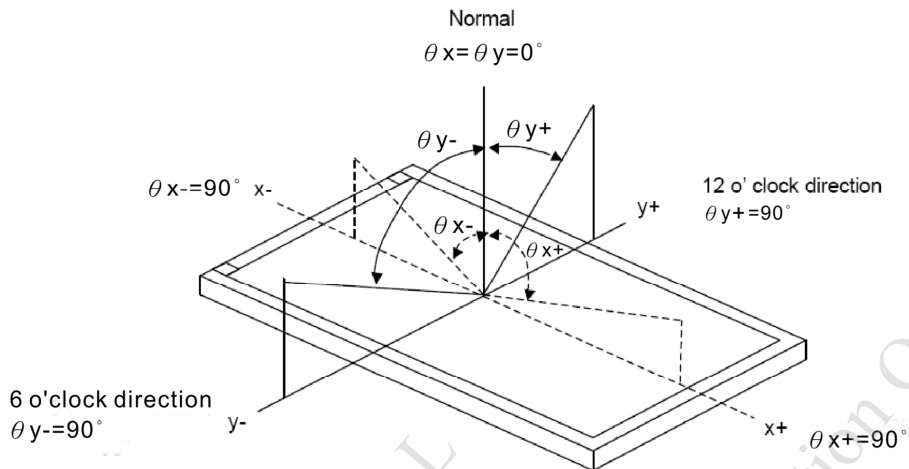
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK	
VIEWING ANGLE	θ_{y+}	CR ≥ 10	$\theta_x=0^\circ$	75	80	—	deg.	NOTE (2) NOTE (3)
	θ_{y-}			75	80	—		
	θ_{x+}		$\theta_y=0^\circ$	75	80	—		
	θ_{x-}			75	80	—		
CONTRAST RATIO (CENTER)	CR	$\theta_x=0^\circ, \theta_y=0^\circ$	600	800	—	—	NOTE (3)	
RESPONSE TIME	TR(rise)+ TF(fall)		—	30	35	msec	NOTE (4)	
COLOR CHROMATICITY (CENTER)	WHITE	Wx	$\theta_x=0^\circ, \theta_y=0^\circ$ VDD-VSS=3.30V ILED = 44mA NTSC : 68%	0.23	0.28	0.33	—	NOTE (5)
		Wy		0.25	0.30	0.35		
	RED	Rx		0.58	0.63	0.68	—	
		Ry		0.29	0.34	0.39		
	GREEN	Gx		0.28	0.33	0.38	—	
		Gy		0.55	0.60	0.65		
	BLUE	Bx		0.10	0.15	0.20	—	
		By		0.02	0.07	0.12		
THE BRIGHTNESS OF MODULE (CENTER)	B		480	530	—	cd/m ²	NOTE (6)	
THE UNIFORMITY OF MODULE	—		70	—	—	%	NOTE (7)	

NOTE (1) : TEST CONDITION :

AFTER STABILIZING AND LEAVING THE PANEL ALONE AT A GIVEN TEMPERATURE FOR 30 MINUTES. MEASUREMENT SHOULD BE EXECUTED IN A STABLE, WINDLESS, AND DARK ROOM.



NOTE (2) : DEFINITION OF VIEWING ANGLE :



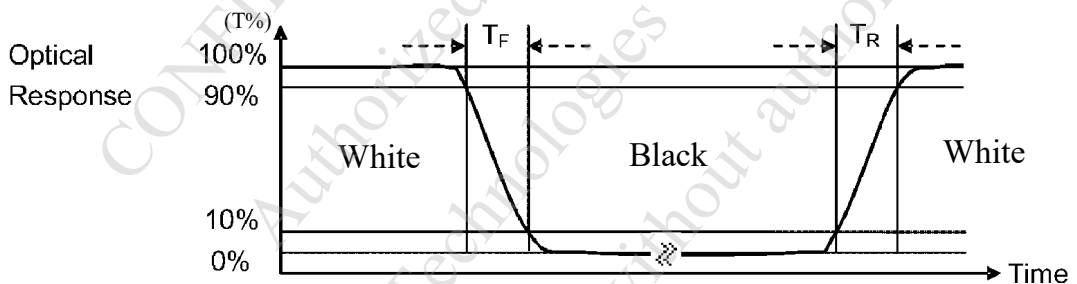
NOTE (3) : DEFINITION OF CONTRAST RATIO (CR) :

MEASURED AT THE CENTER POINT OF MODULE

$$\text{CONTRAST RATIO(CR)} = \frac{\text{BRIGHTNESS MEASURED WHEN LCD IS AT "WHITE STATE"}}{\text{BRIGHTNESS MEASURED WHEN LCD IS AT "BLACK STATE"}}$$

NOTE (4) : DEFINITION OF RESPONSE TIME : T_R AND T_F

THE FIGURE BELOW IS THE OUTPUT SIGNAL OF THE PHOTO DETECTOR.



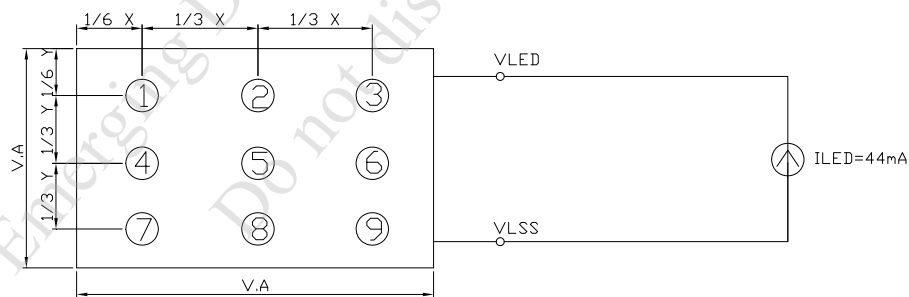
NOTE (5) : DEFINITION OF COLOR CHROMATICITY

(a) 100% RGB PIXEL DATA TRANSMISSION WHEN ALL THE INPUT TERMINALS OF MODULE ARE ELECTRICALLY POWERED ON.

(b) MEASURED AT THE CENTER POINT OF MODULE

NOTE (6) : MEASURED THE BRIGHTNESS OF WHITE STATE AT CENTER POINT.

NOTE (7) : (a) DEFINITION OF BRIGHTNESS UNIFORMITY

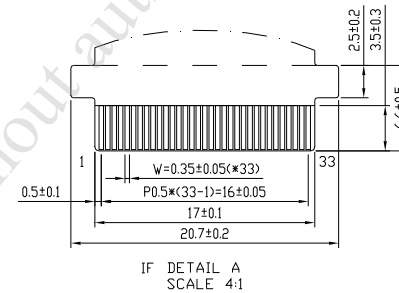
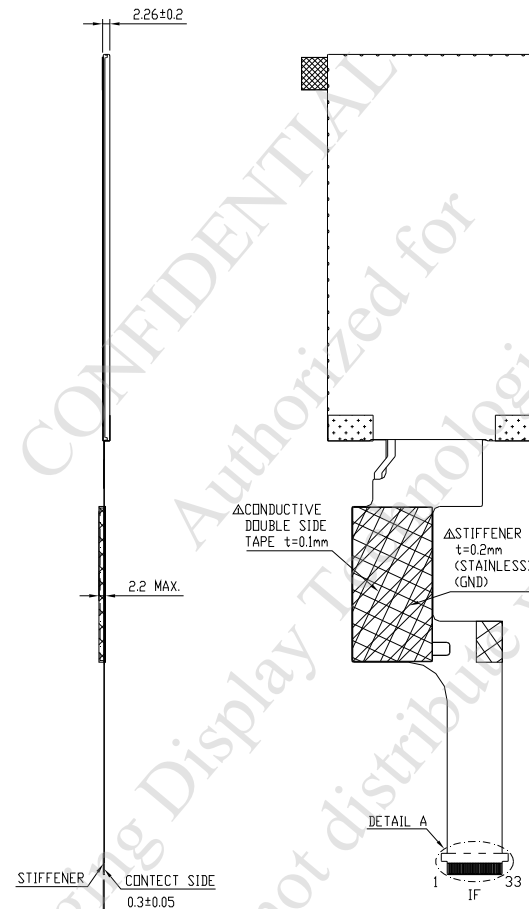
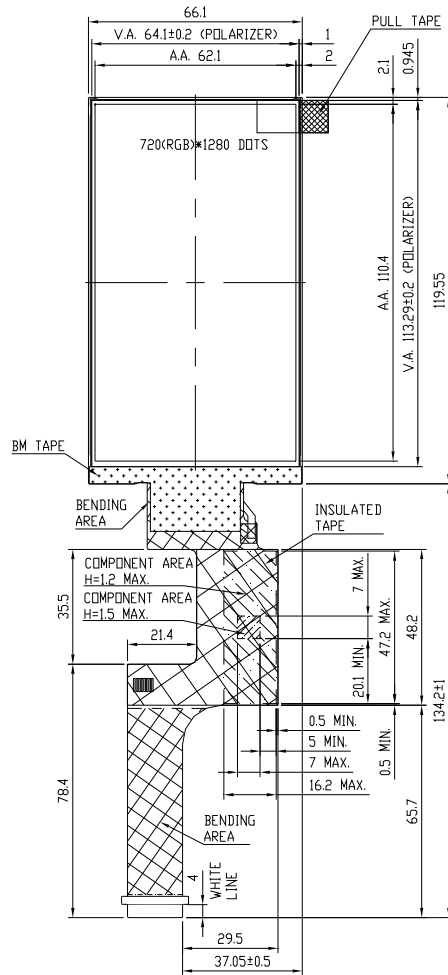


UNIT : mm

(b) THE BRIGHTNESS UNIFORMITY CALCULATING METHOD

$$\text{UNIFORMITY} : \frac{\text{MINIMUM BRIGHTNESS}}{\text{MAXIMUM BRIGHTNESS}} * 100\%$$

7. OUTLINE DIMENSIONS



UNIT : mm

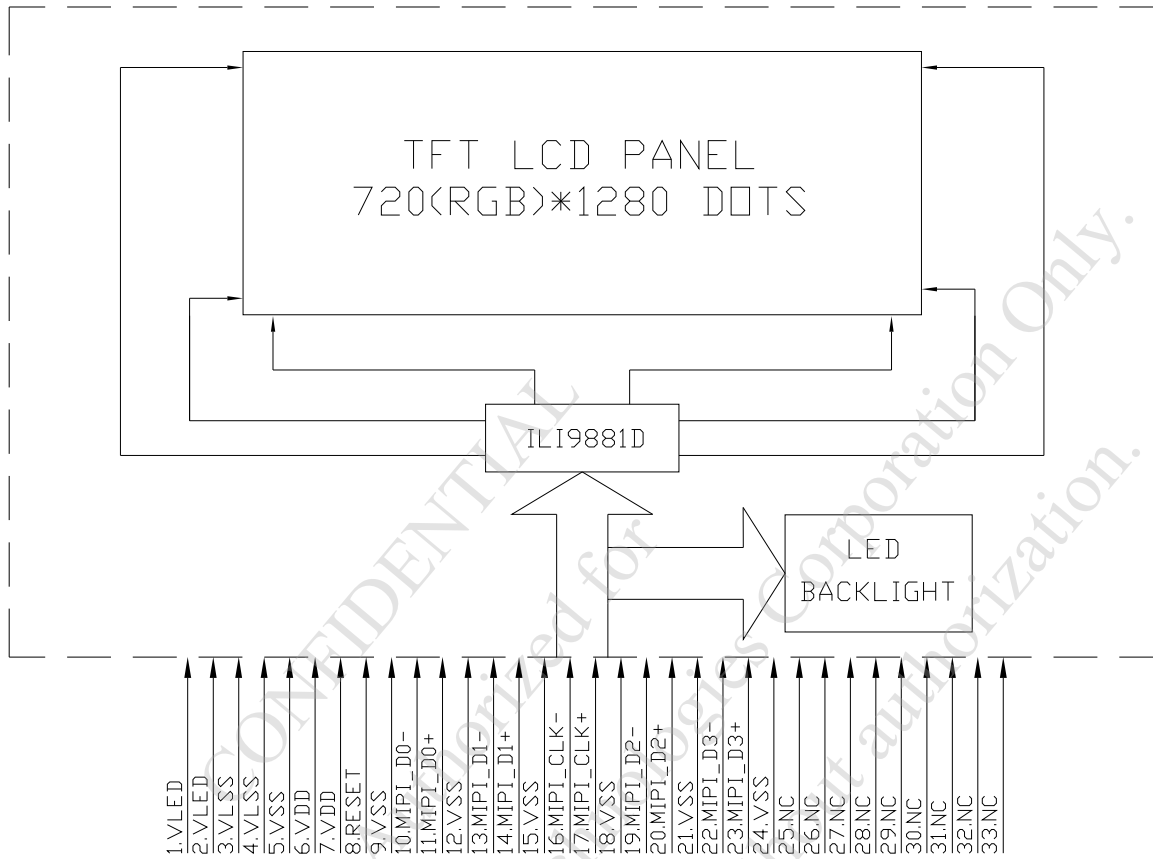
SCALE : NTS

NOT SPECIFIED TOLERANCE IS ±0.3mm

NOTE :

- 1.RECOMMEND MATCH CONNECTOR ACES : 88511 33 SERIES
- 2.MARK△MODIFY (NUMBER NOTE MODIFY VERSION)

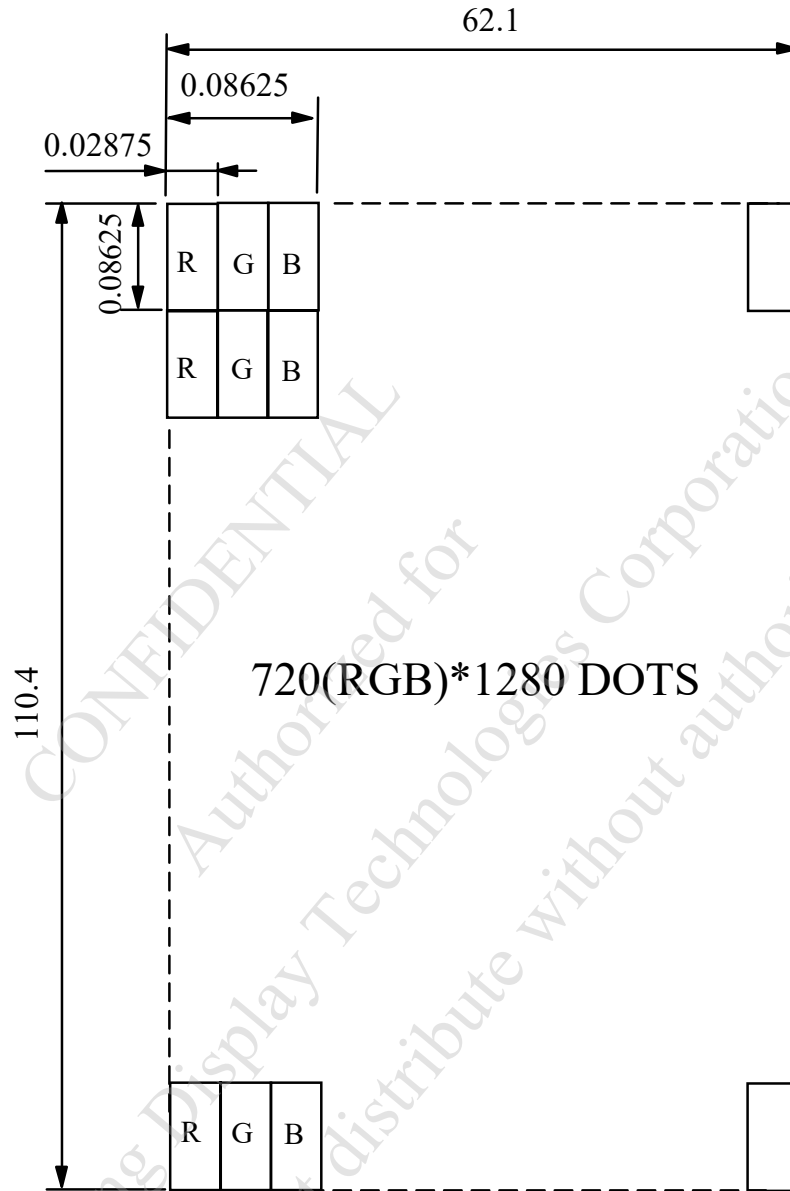
8. BLOCK DIAGRAM



NOTE (1) : PULL UP RESISTOR: 10KΩ

CONFIDENTIAL
 Emerging Display Technologies Corporation
 Do not distribute without authorization.

9. DETAIL DRAWING OF DOT MATRIX



720(RGB)*1280 DOTS

UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ± 0.1
DOTS MATRIX TOLERANCE IS ± 0.01

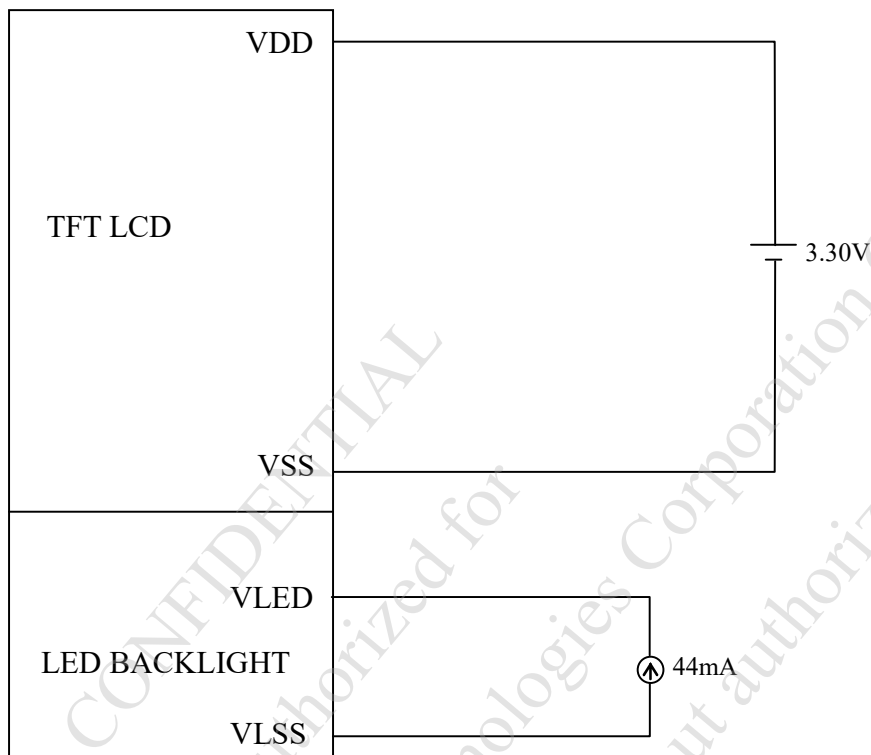
CONFIDENTIAL
Authorized for
Emerging Display Technologies Corporation Only.
Do not distribute without authorization.

10. INTERFACE SIGNALS

NO.	SYMBOL	FUNCTION
1	VLED	LED BACKLIGHT ANODE
2	VLED	LED BACKLIGHT ANODE
3	VLSS	LED BACKLIGHT CATHODE
4	VLSS	LED BACKLIGHT CATHODE
5	VSS	TFT POWER GROUND
6	VDD	POWER SUPPLY VOLTAGE FOR LCD
7	VDD	POWER SUPPLY VOLTAGE FOR LCD
8	RESET	RESET LOW IS ACTIVE. NORMALLY PULLED HIGH.
9	VSS	TFT POWER GROUND
10	MIPI_D0-	MIPI DATA LANE0 INPUT (NEGATIVE)
11	MIPI_D0+	MIPI DATA LANE0 INPUT (POSITIVE)
12	VSS	TFT POWER GROUND
13	MIPI_D1-	MIPI DATA LANE1 INPUT (NEGATIVE)
14	MIPI_D1+	MIPI DATA LANE1 INPUT (POSITIVE)
15	VSS	TFT POWER GROUND
16	MIPI_CLK-	MIPI CLK INPUT (NEGATIVE)
17	MIPI_CLK+	MIPI CLK INPUT (POSITIVE)
18	VSS	TFT POWER GROUND
19	MIPI_D2-	MIPI DATA LANE2 INPUT (NEGATIVE)
20	MIPI_D2+	MIPI DATA LANE2 INPUT (POSITIVE)
21	VSS	TFT POWER GROUND
22	MIPI_D3-	MIPI DATA LANE3 INPUT (NEGATIVE)
23	MIPI_D3+	MIPI DATA LANE3 INPUT (POSITIVE)
24	VSS	TFT POWER GROUND
25	NC	NON CONNECTION
26	NC	NON CONNECTION
27	NC	NON CONNECTION
28	NC	NON CONNECTION
29	NC	NON CONNECTION
30	NC	NON CONNECTION
31	NC	NON CONNECTION
32	NC	NON CONNECTION
33	NC	NON CONNECTION

11. POWER SUPPLY

11.1 POWER SUPPLY FOR LCM



12. INSPECTION CRITERIA

12.1 APPLICATION

THIS INSPECTION STANDARD IS TO BE APPLIED TO THE LCD MODULE DELIVERED FROM EMERGING DISPLAY TECHNOLOGIES CORP.(E.D.T) TO CUSTOMERS

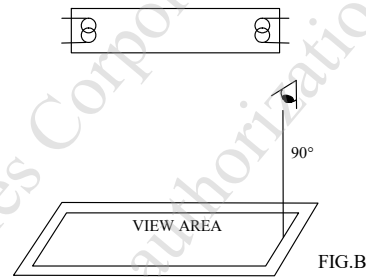
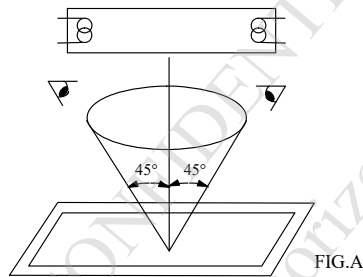
12.2 INSPECTION CONDITIONS

12.2.1 (1)OBSERVATION DISTANCE : 45 ± 5 cm

(2)VIEWING ANGLE : $\pm 45^\circ$

$\pm 45^\circ$ (FOR SECTION WITHIN VIEWING AREA), REFER TO FIG.A
 90° (FOR SECTION OUTSIDE OF VIEWING AREA), REF TO FIG.B
PERPENDICULAR TO MODULE SURFACE

VIEWING ANGLE SHOULD BE SMALLER THAN 45°



THE INSPECTION CRITERIA IS ACCORDING TO LINE OF SIGHT. INSPECTION SHALL BE MADE WITHIN THE HALF SECTION OF THE VIEWING CONE GENERATED BY LINE SEGMENT OF 45° WITH RESPECT TO THE VERTICAL AXIS FROM CENTER VERTEX OF LCD, THE FLUORESCENT LAMP AND THE CONE AXIS MUST BE PERPENDICULAR TO THE LCD SURFACE.

IF THE DEFECTS ARE OUTSIDE OF VIEWING AREA, IT SHALL BE INSPECTED BY 90° WITH RESPECT TO THE VERTICAL AXIS FROM EDGE OF VIEWING AREA.

12.2.2 ENVIRONMENT CONDITIONS :

AMBIENT TEMPERATURE		$25 \pm 5^\circ\text{C}$
AMBIENT HUMIDITY		$65 \pm 20\% \text{RH}$
AMBIENT ILLUMINATION	COSMETIC INSPECTION	600~800 lux
	FUNCTIONAL INSPECTION	300~500 lux
INSPECTION TIME		10 secs

12.2.3 INSPECTION LOT

QUANTITY PER DELIVERY LOT FOR EACH MODEL

12.2.4 INSPECTION METHOD

A SAMPLING INSPECTION SHALL BE MADE ACCORDING TO THE FOLLOWING PROVISIONS TO JUDGE THE ACCEPTABILITY

(a)APPLICABLE STANDARD :

ANSI/ ASQ Z1.4 NORMAL INSPECTION LEVEL II

(b)AQL : MAJOR DEFECT : AQL 0.65

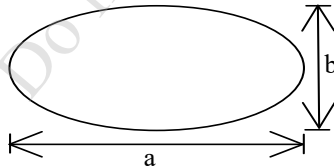
MINOR DEFECT : AQL 1.0

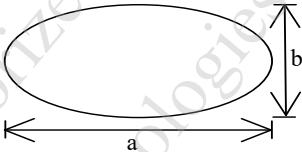
12.3 INSPECTION STANDARDS

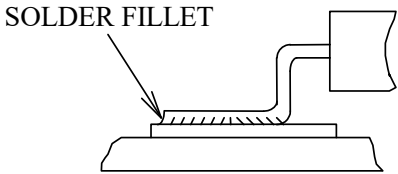
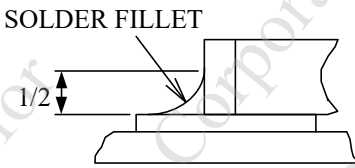
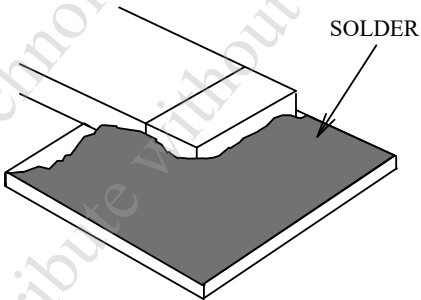
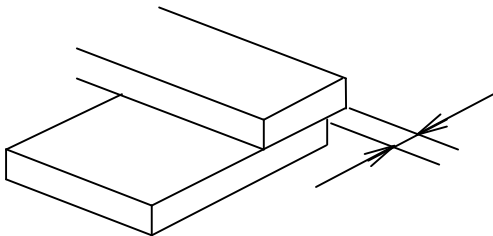
12.3.1 VISUAL DEFECTS CLASSIFICATION

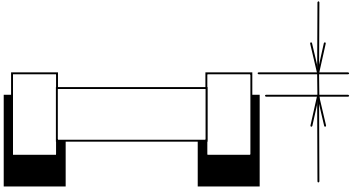
TYPE OF DEFECT	INSPECTION ITEM	DEFECT FEATURE	AQL
MAJOR DEFECT	1.DISPLAY ON	<ul style="list-style-type: none"> • DEFECT TO MISS SPECIFIED DISPLAY FUNCTION, FOR ALL AND SPECIFIED DOTS EX: DISCONNECTION, SHORT CIRCUIT ETC 	0.65
	2.BACKLIGHT	<ul style="list-style-type: none"> • NO LIGHT • FLICKERING AND OTHER ABNORMAL ILLUMINATION 	
	3.DIMENSIONS	<ul style="list-style-type: none"> • SUBJECT TO INDIVIDUAL ACCEPTANCE SPECIFICATIONS 	
MINOR DEFECT	1.DISPLAY ZONE	<ul style="list-style-type: none"> • BLACK/WHITE SPOT • BUBBLES ON POLARIZER • NEWTON RING • BLACK/WHITE LINE • SCRATCH • CONTAMINATION • UNEVEN COLOR SPREAD 	1.0
	2.BEZEL ZONE	<ul style="list-style-type: none"> • STAINS • SCRATCHES • FOREIGN MATTER 	
	3.SOLDERING	<ul style="list-style-type: none"> • INSUFFICIENT SOLDER • SOLDERED IN INCORRECT POSITION • CONVEX SOLDERING SPOT • SOLDER BALLS • SOLDER SCRAPS 	
	4.DISPLAY ON (ALL ON)	<ul style="list-style-type: none"> • LIGHT LINE 	

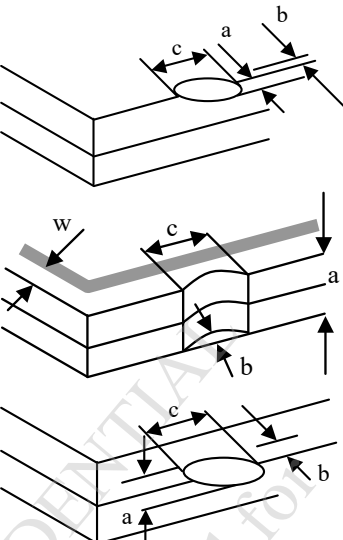
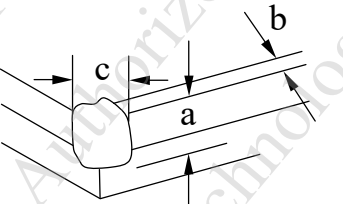
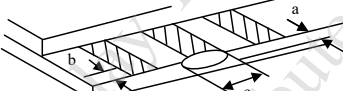
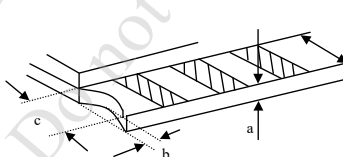
12.3.2 MODULE DEFECTS CLASSIFICATION

NO.	ITEM	CRITERIA												
1	DISPLAY ON INSPECTION	(1)INCORRECT PATTERN (2)MISSING SEGMENT (3)DIM SEGMENT (4)OPERATING VOLTAGE BEYOND SPEC												
2	OVERALL DIMENSIONS	(1)OVERALL DIMENSION BEYOND SPEC												
3	PIXEL DEFECT	(1) INSPECTION PATTERN: FULL WHITE, FULL BLACK, RED, GREEN AND BLUE SCREENS. (2) <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>ITEMS</th> <th>ACCEPTABLE COUNT</th> </tr> </thead> <tbody> <tr> <td>BRIGHT PIXEL</td> <td>$N \leq 1$</td> </tr> <tr> <td>DARK PIXEL</td> <td>$N \leq 3$</td> </tr> <tr> <td>TOTAL BRIGHT AND DARK PIXELS</td> <td>$N \leq 3$</td> </tr> </tbody> </table> <p>NOTE :</p> <p>1. THE DEFINITION OF PIXEL : THE SIZE OF A DEFECTIVE PIXEL OVER 1/2 OF WHOLE PIXEL IS REGARDED AS ONE DEFECTIVE PIXEL.</p> <p>2. BRIGHT PIXEL : PIXELS APPEAR BRIGHT AND UNCHANGED IN SIZE IN WHICH LCD PANEL IS DISPLAYING UNDER BLACK PATTERN. THE BRIGHT PIXEL DEFECT MUST BE VISIBLE THROUGH 6% ND FILTER.</p> <p>3. DARK PIXEL : PIXELS APPEAR DARK AND UNCHANGED IN SIZE IN WHICH LCD PANEL IS DISPLAYING UNDER PURE RED, GREEN, BLUE PICTURE.</p>	ITEMS	ACCEPTABLE COUNT	BRIGHT PIXEL	$N \leq 1$	DARK PIXEL	$N \leq 3$	TOTAL BRIGHT AND DARK PIXELS	$N \leq 3$				
ITEMS	ACCEPTABLE COUNT													
BRIGHT PIXEL	$N \leq 1$													
DARK PIXEL	$N \leq 3$													
TOTAL BRIGHT AND DARK PIXELS	$N \leq 3$													
4	FOREIGN BLACK/WHITE/ BRIGHT LINE/ SCRATCH OF VIEWING AREA	<table border="1" style="margin-left: 20px;"> <thead> <tr> <th>LENGTH : L</th> <th>WIDTH : W</th> <th>PERMISSIBLE NO.</th> </tr> </thead> <tbody> <tr> <td>$L \leq 5$</td> <td>$W \leq 0.05$</td> <td>IGNORE</td> </tr> <tr> <td>$5 < L \leq 8$</td> <td>$0.05 < W \leq 0.1$</td> <td>5</td> </tr> <tr> <td>$8 < L$</td> <td>$0.1 < W$</td> <td>NONE</td> </tr> </tbody> </table> <p>WIDTH : W mm, LENGTH : L mm</p>	LENGTH : L	WIDTH : W	PERMISSIBLE NO.	$L \leq 5$	$W \leq 0.05$	IGNORE	$5 < L \leq 8$	$0.05 < W \leq 0.1$	5	$8 < L$	$0.1 < W$	NONE
LENGTH : L	WIDTH : W	PERMISSIBLE NO.												
$L \leq 5$	$W \leq 0.05$	IGNORE												
$5 < L \leq 8$	$0.05 < W \leq 0.1$	5												
$8 < L$	$0.1 < W$	NONE												
5	FOREIGN MATTER \ BLACK SPOTS \ WHITE SPOTS \ DENT (INCLUDING LIGHT LEAKAGE DUE TO POLARIZING PLATES PINHOLES, ETC.)	<table border="1" style="margin-left: 20px;"> <thead> <tr> <th>AVERAGE DIAMETER (mm): D</th> <th>NUMBER OF PIECES PERMITTED</th> </tr> </thead> <tbody> <tr> <td>$D \leq 0.15$</td> <td>IGNORE</td> </tr> <tr> <td>$0.15 < D \leq 0.5$</td> <td>4</td> </tr> <tr> <td>$0.5 < D$</td> <td>NONE</td> </tr> </tbody> </table> <p>NOTE : DIAMETER $D=(a+b)/2$</p> 	AVERAGE DIAMETER (mm): D	NUMBER OF PIECES PERMITTED	$D \leq 0.15$	IGNORE	$0.15 < D \leq 0.5$	4	$0.5 < D$	NONE				
AVERAGE DIAMETER (mm): D	NUMBER OF PIECES PERMITTED													
$D \leq 0.15$	IGNORE													
$0.15 < D \leq 0.5$	4													
$0.5 < D$	NONE													

NO.	ITEM	CRITERIA		
			AVERAGE DIAMETER (mm) : D	NUMBER OF PIECES PERMITTED
6	BUBBLES OF POLARIZER /DIRT/CF FAIL /SURFACE STAINS	BUBBLE ON THE POLARIZER	$D \leq 0.25$	LGNORE
			$0.25 < D \leq 0.5$	$N \leq 5$
			$0.5 < D$	NONE
		SURFACE STAINS	$D < 0.1$	IGNORE
			$0.1 < D \leq 0.3$	$N \leq 3$
			$0.3 < D$	NONE
		CF FAIL / SPOT	$D < 0.1$	IGNORE
			$0.1 < D \leq 0.3$	$N \leq 3$
			$0.3 < D$	NONE
				<p>NOTE : (1)POLARIZER BUBBLE IS DEFINED AS THE BUBBLE APPEARS ON ACTIVE DISPLAY AREA. THE DEFECT OF POLARIZER BUBBLE SHALL BE IGNORED IF THE POLARIZER BUBBLE APPEARS ON THE OUTSIDE OF ACTIVE DISPLAY AREA.</p> <p>(2)THE EXTRANEIOUS SUBSTANCE IS DEFINED AS IT CAN BE OBSERVED WHEN THE MODULE IS POWER ON.</p> <p>(3)THE DEFINITION OF AVERAGE DIAMETER, D IS DEFINED AS FOLLOWING.</p> <p>AVERAGE DIAMETER (D)=(a+b)/2</p> 
7	LINE DEFECT ON DISPLAY	OBVIOUS VERTICAL OR HORIZONTAL LINE DEFECT IS NOT ALLOWED		
8	MURA ON DISPLAY	IT'S OK IF MURA IS SLIGHT VISIBLE THROUGH 2% ND FILTER		
9	UNEVEN COLOR SPREAD, COLORATION	(1)TO BE DETERMINED BASED UPON THE STANDARD SAMPLE.		
10	BEZEL APPEARANCE	<p>(1)BEZEL MAY NOT HAVE RUST, BE DEFORMED OR HAVE FINGER PRINTS STAINS OF OTHER CONTAMINATION.</p> <p>(2)BEZEL MUST COMPLY WITH JOB SPECIFICATIONS.</p>		
11	PCB	<p>(1)THERE MAY NOT BE MORE THAN 2mm OF SEALANT OUTSIDE THE SEAL AREA ON THE PCB, AND THERE SHOULD BE NO MORE THAN THREE PLACES.</p> <p>(2)NO OXIDATION OR CONTAMINATION PCB TERMINALS.</p> <p>(3)PARTS ON PCB MUST BE THE SAME AS ON THE PRODUCTION CHARACTERISTIC CHART. THERE SHOULD BE NO WRONG PARTS, MISSING PARTS OR EXCESS PARTS.</p> <p>(4)THE JUMPER ON THE PCB SHOULD CONFORM TO THE PRODUCT CHARACTERISTIC CHART.</p> <p>(5)IF SOLDER GETS ON BEZEL TAB PADS, LED PAD, ZEBRA PAD OR SCREW HOLD PAD; MAKE SURE IT IS SMOOTHED DOWN.</p>		

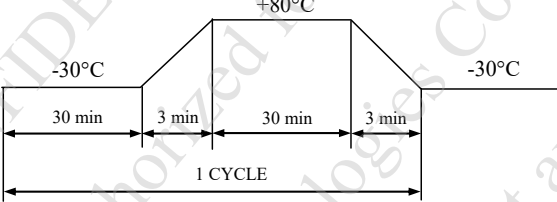
NO.	ITEM	CRITERIA
12	SOLDERING	<p>(1) NO SOLDERING FOUND ON THE SPECIFIED PLACE (2) INSUFFICIENT SOLDER</p> <p>(a) LSI, IC A POOR WETTING OF SOLDER IS BETWEEN LOWER BEND OR "HEEL" OF LEAD AND PAD</p>  <p>(b) CHIP COMPONENT · SOLDER IS LESS THAN 50% OF SIDES AND FRONT FACE WETTING</p>  <p>· SOLDER WETS 3 SIDES OF TERMINAL, BUT LESS THAN 25% OF SIDES AND FRONT SURFACE AREA ARE COVERED</p>  <p>(3) PARTS ALIGNMENT (a) LSI, IC LEAD WIDTH IS MORE THAN 50% BEYOND PAD OUTLINE</p> 

NO.	ITEM	CRITERIA
12	SOLDERING	<p>(b)CHIP COMPONENT COMPONENT IS OFF CENTER, AND MORE THAN 50% OF THE LEADS IS OFF THE PAD OUTLINE</p>  <p>(4)NO UNMELTED SOLDER PASTE MAY BE PRESENT ON THE PCB. (5)NO COLD SOLDER JOINTS, MISSING SOLDER CONNECTIONS, OXIDATION OR ICICLE. (6)NO RESIDUE OR SOLDER BALLS ON PCB. (7)NO SHORT CIRCUITS IN COMPONENTS ON PCB.</p>
13	BACKLIGHT	<p>(1)NO LIGHT (2)FLICKERING AND OTHER ABNORMAL ILLUMINATION (3)SPOTS OR SCRATCHES THAT APPEAR WHEN LIT MUST BE JUDGED USING LCD SPOT, LINES AND CONTAMINATION STANDARDS. (4)BACKLIGHT DOESN'T LIGHT OR COLOR IS WRONG.</p>
14	GENERAL APPEARANCE	<p>(1)NO OXIDATION, CONTAMINATION, CURVES OR, BENDS ON INTERFACE PIN (OLB) OF TCP. (2)NO CRACKS ON INTERFACE PIN (OLB) OF TCP. (3)NO CONTAMINATION, SOLDER RESIDUE OR SOLDER BALLS ON PRODUCT. (4)THE IC ON THE TCP MAY NOT BE DAMAGED, CIRCUITS. (5)THE UPPERMOST EDGE OF THE PROTECTIVE STRIP ON THE INTERFACE PIN MUST BE PRESENT OR LOOK AS IF IT CAUSE THE INTERFACE PIN TO SEVER. (6)THE RESIDUAL ROSIN OR TIN OIL OF SOLDERING (COMPONENT OR CHIP COMPONENT) IS NOT BURNED INTO BROWN OR BLACK COLOR. (7)SEALANT ON TOP OF THE ITO CIRCUIT HAS NOT HARDENED. (8)PIN TYPE MUST MATCH TYPE IN SPECIFICATION SHEET. (9)LCD PIN LOOSE OR MISSING PINS. (10)PRODUCT PACKAGING MUST THE SAME AS SPECIFIED ON PACKAGING SPECIFICATION SHEET. (11)PRODUCT DIMENSION AND STRUCTURE MUST CONFORM TO PRODUCT SPECIFICATION SHEET. (12)THE APPEARANCE OF HEAT SEAL SHOULD NOT ADMIT ANY DIRT AND BREAK.</p>

NO.	ITEM	CRITERIA										
15	CRACKED GLASS	<p>THE LCD WITH EXTENSIVE CRACK IS NOT ACCEPTABLE</p>										
		<p>GENERAL GLASS CHIP :</p> 	<table border="1" data-bbox="933 421 1455 497"> <thead> <tr> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr> <td>$\leq t/2$</td> <td>< VIEWING AREA</td> <td>$\leq 1/8X$</td> </tr> <tr> <td>$t/2 >, \leq 2t$</td> <td>$\leq W/2$</td> <td>$\leq 1/8X$</td> </tr> </tbody> </table> <p>*W=DISTANCE BETWEEN SEALANT AREA AND LCD PANEL EDGE X = LCD SIDE LENGTH t = GLASS THICKNESS</p>	a	b	c	$\leq t/2$	< VIEWING AREA	$\leq 1/8X$	$t/2 >, \leq 2t$	$\leq W/2$	$\leq 1/8X$
		a	b	c								
		$\leq t/2$	< VIEWING AREA	$\leq 1/8X$								
$t/2 >, \leq 2t$	$\leq W/2$	$\leq 1/8X$										
<p>CORNER PART :</p> 	<table border="1" data-bbox="933 1003 1455 1079"> <thead> <tr> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr> <td>$\leq t/2$</td> <td>< VIEWING AREA</td> <td>$\leq 1/8X$</td> </tr> <tr> <td>$> t/2, \leq 2t$</td> <td>$\leq W/2$</td> <td>$\leq 1/8X$</td> </tr> </tbody> </table> <p>*W=DISTANCE BETWEEN SEALANT AREA AND LCD PANEL EDGE X = LCD SIDE LENGTH t = GLASS THICKNESS</p>	a	b	c	$\leq t/2$	< VIEWING AREA	$\leq 1/8X$	$> t/2, \leq 2t$	$\leq W/2$	$\leq 1/8X$		
a	b	c										
$\leq t/2$	< VIEWING AREA	$\leq 1/8X$										
$> t/2, \leq 2t$	$\leq W/2$	$\leq 1/8X$										
<p>CHIP ON ELECTRODE PAD</p> 	<table border="1" data-bbox="933 1272 1455 1326"> <thead> <tr> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr> <td>$\leq t$</td> <td>$\leq 0.5\text{mm}$</td> <td>$\leq 1/8X$</td> </tr> </tbody> </table> <p>* X=LCD SIDE WIDTH t=GLASS THICKNESS</p>	a	b	c	$\leq t$	$\leq 0.5\text{mm}$	$\leq 1/8X$					
a	b	c										
$\leq t$	$\leq 0.5\text{mm}$	$\leq 1/8X$										
	<table border="1" data-bbox="933 1429 1455 1482"> <thead> <tr> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr> <td>$\leq t$</td> <td>$\leq 1/8X$</td> <td>$\leq L$</td> </tr> </tbody> </table> <p>*X=LCD SIDE WIDTH t = GLASS THICKNESS L=ELECTRODE PAD LENGTH ①IF GLASS CHIPPING THE ITO TERMINAL, OVER 2/3 OF THE ITO MUST REMAIN AND BE, INSPECTED ACCORDING TO ELECTRODE TERMINAL SPECIFICATIONS ②IF THE PRODUCT WILL BE HEAT SEALED BY THE CUSTOMER, THE ALIGNMENT MARK MUST NOT BE DAMAGED</p>	a	b	c	$\leq t$	$\leq 1/8X$	$\leq L$					
a	b	c										
$\leq t$	$\leq 1/8X$	$\leq L$										

13. RELIABILITY TEST

13.1 STANDARD SPECIFICATIONS FOR RELIABILITY OF LCD MODULE

NO.	ITEM	DESCRIPTION
1	HIGH TEMPERATURE OPERATION	THE SAMPLE SHOULD BE ALLOWED TO STAND AT +70°C FOR 240 HRS
2	LOW TEMPERATURE OPERATION	THE SAMPLE SHOULD BE ALLOWED TO STAND AT -20°C FOR 240 HRS
3	HIGH TEMPERATURE STORAGE	THE SAMPLE SHOULD BE ALLOWED TO STAND AT +80°C FOR 240 HRS
4	LOW TEMPERATURE STORAGE	THE SAMPLE SHOULD BE ALLOWED TO STAND AT -30°C FOR 240 HRS
5	HIGH TEMPERATURE / HUMIDITY TEST STORAGE	THE SAMPLE SHOULD BE ALLOWED TO STAND AT 60°C, 90% RH 240 HRS
6	THERMAL SHOCK (NOT OPERATED)	THE SAMPLE SHOULD BE ALLOWED TO STAND THE FOLLOWING 10 CYCLES OF OPERATION: 
7	ESD (ELECTROSTATIC DISCHARGE) (NOT OPERATED)	AIR DISCHARGE ± 12KV CONTACT DISCHARGE ± 8KV (ACCORDING TO IEC-61000-4-2)

NOTE (1) : THE TEST SAMPLES HAVE RECOVERY TIME FOR 2 HOURS AT ROOM TEMPERATURE BEFORE THE FUNCTION CHECK. IN THE STANDARD CONDITIONS, THERE IS NO DISPLAY FUNCTION NG ISSUE OCCURRED.

13.2 TESTING CONDITIONS AND INSPECTION CRITERIA

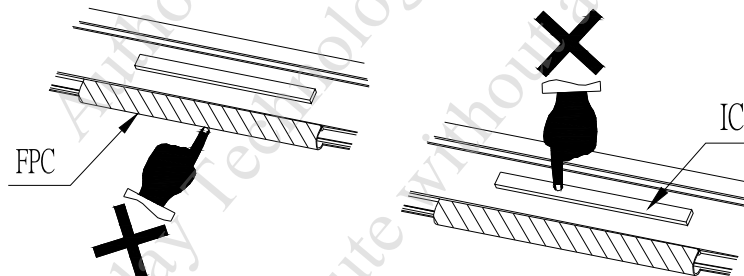
FOR THE FINAL TEST THE TESTING SAMPLE MUST BE STORED AT ROOM TEMPERATURE FOR 24 HOURS, AFTER THE TESTS LISTED IN TABLE 13.1, STANDARD SPECIFICATIONS FOR RELIABILITY HAVE BEEN EXECUTED IN ORDER TO ENSURE STABILITY.

NO.	ITEM	TEST MODEL	INSPECTION CRITERIA
1	CURRENT CONSUMPTION	REFER TO SPECIFICATION	THE CURRENT CONSUMPTION SHOULD CONFORM TO THE PRODUCT SPECIFICATION.
2	CONTRAST	REFER TO SPECIFICATION	AFTER THE TESTS HAVE BEEN EXECUTED, THE CONTRAST MUST BE LARGER THAN HALF OF ITS INITIAL VALUE PRIOR TO THE TESTS.
3	APPEARANCE	VISUAL INSPECTION	DEFECT FREE

14. CAUTION

14.1 OPERATION

- 14.1.1 DO NOT CONNECT OR DISCONNECT MODULES TO OR FROM THE MAIN SYSTEM WHILE POWER IS BEING SUPPLIED .
- 14.1.2 USE THE MODULE WITHIN SPECIFIED TEMPERATURE ; LOWER TEMPERATURE CAUSES THE RETARDATION OF BLINKING SPEED OF THE DISPLAY ; HIGHER TEMPERATURE MAKES OVERALL DISPLAY DISCOLOR . WHEN THE TEMPERATURE RETURNS TO NORMALITY, THE DISPLAY WILL OPERATE NORMALLY.
- 14.1.3 ADJUST THE LC DRIVING VOLTAGE TO OBTAIN THE OPTIMUM CONTRAST .
- 14.1.4 POWER ON SEQUENCE INPUT SIGNALS SHOULD NOT BE SUPPLIED TO LCD MODULE BEFORE POWER SUPPLY VOLTAGE IS APPLIED AND REACHES THE SPECIFIED VALUE.
IF ABOVE SEQUENCE IS NOT FOLLOWED , CMOS LSIS OF LCD MODULES MAY BE DAMAGED DUE TO LATCH - UP PROBLEM.
- 14.1.5 NOT ALLOWED TO INFLICT ANY EXTERNAL STRESS AND TO CAUSE ANY MECHANICAL INTERFERENCE ON THE BENDING AREA OF FPC DURING THE TAIL BENDING BACKWARDS!
DO NOT STRESS FPC AND IC ON THE MODULE!



14.2 NOTICE

- 14.2.1 USE A GROUNDED SOLDERING IRON WHEN SOLDERING CONNECTOR I/O TERMINALS . FOR SOLDERING OR REPAIRING, TAKE PRECAUTION AGAINST THE TEMPERATURE OF THE SOLDERING IRON AND THE SOLDERING TIME TO PREVENT PEELING OFF THE THROUGH-HOLE-PAD .
- 14.2.2 DO NOT DISASSEMBLE . EDT SHALL NOT BE HELD RESPONSIBLE IF THE MODULE IS DISASSEMBLED AND UPON THE REASSEMBLY THE MODULE FAILED.
- 14.2.3 DO NOT CHARGE STATIC ELECTRICITY, AS THE CIRCUIT OF THIS MODULE CONTAINS CMOS LSIS. A WORKMAN'S BODY SHOULD ALWAYS BE STATIC-PROTECTED BY USE OF AN ESD STRAP. WORKING CLOTHES FOR SUCH PERSONNEL SHOULD BE OF STATIC-PROTECTED MATERIAL.
- 14.2.4 ALWAYS GROUND THE ELECTRICALLY-POWERED DRIVER BEFORE USING IT TO INSTALL THE LCD MODULE. WHILE CLEANING THE WORK STATION BY VACUUM CLEANER, DO NOT BRING THE SUCKING MOUTH NEAR THE MODULE ; STATIC ELECTRICITY OF THE ELECTRICALLY-POWERED DRIVER OR THE VACUUM CLEANER MAY DESTROY THE MODULE.
- 14.2.5 DON'T GIVE EXTERNAL SHOCK.
- 14.2.6 DON'T APPLY EXCESSIVE FORCE ON THE SURFACE.
- 14.2.7 LIQUID IN LCD IS HAZARDOUS SUBSTANCE. MUST NOT LICK AND SWALLOW.
WHEN THE LIQUID IS ATTACH TO YOUR, SKIN, CLOTH ETC. WASH IT OUT THOROUGHLY AND IMMEDIATELY.
- 14.2.8 DON'T OPERATE IT ABOVE THE ABSOLUTE MAXIMUM RATING.
- 14.2.9 STORAGE IN A CLEAN ENVIRONMENT, FREE FROM DUST, ACTIVE GAS, AND SOLVENT.
- 14.2.10 STORE WITHOUT ANY PHYSICAL LOAD.
- 14.2.11 REWIRING: NO MORE THAN 3 TIMES.