SPECIFICATION
FOR
LCD MODULE

MODULE NO: AFM240128D0-4.8N6NTM
REVISION NO: 00

Customer's Approval:

	SIGNATURE	DATE
PREPARED BY (RD ENGINEER)		
CHECKED BY		
APPROVED BY		

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CONTENTS

DATE	DESCRIPTION
2018-11-30	First release

1. DISPLAY CHARACTERISTICS

Item	Contents	Note
Resolution(H*V)	**240×128 Dots**	
Colors	**Mono TFT display**	
Font & Background Color	**Font:BLACK,Background:YellowGreen**	
Active area (L*W)	110.88 mm(L)×59.13 mm(W)	
Viewing area (L*W)	113 mm(L)×63.64 mm(W)	
Module size (L*W*H)	144 mm(L)×104 mm(W)x14.7(H)	
Back light type	LED	
B/L brightness	**500nit**	
Touch Panel Type	Without	
Controller IC	UCi6963(FONT-01)	
Viewing Direction	6 o' clock	
Contrast Ratio	**500(typ.)**	

2. Pin Description(CON1):

Pin No.	Symbol	External Connection	Function Description
1	FG		Frame ground
2	VSS	Power Supply	GND
3	VDD	Power Supply	Power supply
4	NC	/	No connection
5	/WR	MPU	Data-write signal for Write Control. LOW: MPU write data into UCi6963.
6	/RD	MPU	Data-read signal for Read Control. LOW: MPU reads data from UCi6963.
7	/CE	MPU	Active LOW Chip Select signal
8	C/D	MPU	Command/Data Select, or Register select: C/D RD WR Function L L / Data-Read L / L Data-Write H L / Status-Read H / L Command-Write
9	NC	/	No connection
10	/RST	MPU	Active LOW Reset signal
11~18	DB0~DB7	MPU	8-bit bidirectional data bus
19	FS	MPU	Font setting: H=6x8, L=8x8
20	NC	/	No connection
21	NC/LED PWM	NC/MPU	Backlight enable signal, 1=On, 0=Off
22	NC	/	No connection

3. Pin Description(CON2):

Pin No.	Symbol	External Connection	Function Description
1	FG		Frame ground
2	VSS	Power Supply	GND
3	VDD	Power Supply	Power supply
4	NC	/	No connection
5	/WR	MPU	Data-write signal for Write Control. LOW: MPU write data into UCi6963.
6	/RD	MPU	Data-read signal for Read Control. LOW: MPU reads data from UCi6963.
7	/CE	MPU	Active LOW Chip Select signal
8	C/D	MPU	Command/Data Select, or Register select: C/D RD WR Function L L / Data-Read L / L Data-Write H L / Status-Read H / L Command-Write
9	/RST	MPU	Active LOW Reset signal
10~17	DB0~DB7	MPU	8-bit bidirectional data bus
18	FS	MPU	Font setting: H=6x8, L=8x8
19	NC	/	No connection
20	NC/LED PWM	NC/MPU	Backlight enable signal, 1=On, 0=Off
21	NC	/	No connection
22	NC	/	No connection

4. Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Temperature Range	Top	Absolute Max	-20	-	+70	^{0}C
Storage Temperature Range	Tst	Absolute Max	-30	-	+80	^{0}C
Supply Voltage	VDD		4.5	5.0	5.5	V
Input High Voltage	VIH		0.8*VDD	-	VDD	V
Input Low Voltage	VIL		0	-	0.2*VDD	V
Supply Current	IVCI		-	210	-	mA
Power Consumption	PLCM		-	1050	-	mW

5. Controller Information

5.1 CONTROL AND DISPLAY INSTRUCTION

COMMAND TABLE

C/D: 1: Command / 0: Data W/R: 0: Write Cycle / 1: Read Cycle D7-D0: –: Don't Care / #: Valid data

No.	Command	C/D	W/R	D7	D6	D5	D4	D3	D2	D1	D0	Action	Value
1.	Set Cursor Pointer	1	0	0	0	1	0	0	0	0	1		21h
		0	0	#	#	#	#	#	#	#	#	Set X address	
		0	0	#	#	#	#	#	#	#	#	Set Y address	
2.	Set Offset Register	1	0	0	0	1	0	0	0	1	0		22h
		0	0	#	#	#	#	#	#	#	#	Data	
		0	0	0	0	0	0	0	0	0	0		00h
3.	Set Address Pointer	1	0	0	0	1	0	0	1	0	0		24h
		0	0	#	#	#	#	#	#	#	#	Low address	
		0	0	#	#	#	#	#	#	#	#	High address	
4.	Set Text Home Addr.	1	0	0	1	0	0	0	0	0	0		40h
		0	0	#	#	#	#	#	#	#	#	Low address	
		0	0	#	#	#	#	#	#	#	#	High address	
5.	Set Text Area	1	0	0	1	0	0	0	0	0	1		41h
		0	0	#	#	#	#	#	#	#	#	Columns	
		0	0	0	0	0	0	0	0	0	0		
6.	Set Graphic Home Addr.	1	0	0	1	0	0	0	0	1	0		42h
		0	0	#	#	#	#	#	#	#	#	Low address	
		0	0	#	#	#	#	#	#	#	#	High address	
7.	Set Graphic Area	1	0	0	1	0	0	0	0	1	1		43h
		0	0	#	#	#	#	#	#	#	#	Columns	
		0	0	0	0	0	0	0	0	0	0		
8.	OR mode	1	0	1	0	0	0	–	0	0	0		8xh
9.	EXOR mode	1	0	1	0	0	0	–	0	0	1		
10.	AND mode	1	0	1	0	0	0	–	0	1	1		
11.	Text Attribute mode	1	0	1	0	0	0	–	1	0	0		
		0	0	–	–	–	–	#	#	#	#		
12.	Internal CG ROM mode	1	0	1	0	0	0	0	–	–	–		
13.	External CG RAM mode	1	0	1	0	0	0	1	–	–	–		
14.	Display Mode	1	0	1	0	0	1	#	#	#	#	Switch Graphic/Text/Cursor/Blink ON/OFF	9xh
15.	Cursor Pattern Select	1	0	1	0	1	0	0	#	#	#	Set cursor: 1~8-line	Axh
16.	Data-write and Increase ADP	1	0	1	1	0	0	0	0	0	0		C0h
		0	0	#	#	#	#	#	#	#	#	Data	
17.	Data-read and Increase ADP	1	1	1	1	0	0	0	0	0	1		C1h
18.	Data-write and Decrease ADP	1	0	1	1	0	0	0	0	1	0		C2h
		0	0	#	#	#	#	#	#	#	#	Data	
19.	Data-read and Decrease ADP	1	1	1	1	0	0	0	0	1	1		C3h
20.	Data-write and Non-variable ADP	1	0	1	1	0	0	0	1	0	0		C4h
		0	0	#	#	#	#	#	#	#	#	Data	
21.	Data-read and Non-variable ADP	1	1	1	1	0	0	0	1	0	1		C5h
22.	Set Data Auto Write	1	0	1	0	1	1	0	0	0	0		B0h
23.	Set Data Auto Read	1	0	1	0	1	1	0	0	0	1		B1h
24.	Auto Reset	1	0	1	0	1	1	0	0	1	0		B2h
25.	Screen Peek	1	0	1	1	1	0	0	0	0	0		E0h
26.	Screen Copy	1	0	1	1	1	0	1	0	0	0		E8h
27.	Bit Set/Reset	1	0	1	1	1	1	#	#	#	#	Set/Reset Bit 0~7	Fxh
28.	Whole Screen Reverse (Triple-byte command)	1	0	1	1	0	1	0	0	0	0		D0h
		0	0	–	–	–	–	–	–	–	#	0: Normal 1: Reverse	
		0	0	–	–	–	–	–	–	–	–	(Don't Care)	

No.	Command	C/D	W/R	D7	D6	D5	D4	D3	D2	D1	D0	Action		Value
29	Blink Time (Triple-byte command)	1	0	0	1	0	1	0	0	0	0			50h
		0	0	–	–	–	–	–	#	#	#	000b: 0.066s 001b: 0.25s **010b: 0.5s** 011b: 1.75s	100b: 1s 101b: 1.25s 110b: 1.5s 111b: 2s	010b
		0	0	–	–	–	–	–	–	–	–	(Don't Care)		
30	Cursor Auto Moving (Triple-byte command)	1	0	0	1	1	0	0	0	0	0			60h
		0	0	–	–	–	–	–	–	–	#	**0: disable** 1: enable		
		0	0	–	–	–	–	–	–	–	–	(Don't Care)		
31	CGROM Font Select (Triple-byte command)	1	0	0	1	1	1	0	0	0	0			70h
		0	0	–	–	–	–	–	–	#	#	00b: Don't care 01b: Don't care 10b: CGROM Font-01 11b: CGROM Font-02		
		0	0	–	–	–	–	–	–	–	–	(Don't Care)		

5.2 Interface Timing Diagram and Timing Characteristics

MPU Interface Timing
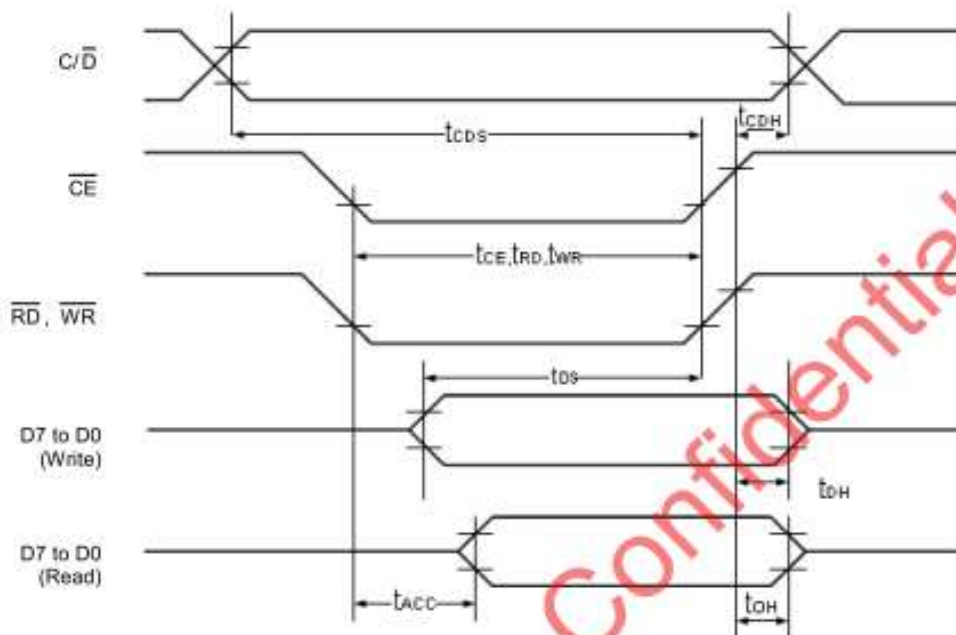
V_{DD} = +5V ± 5%, GND = 0V, T_A = –20~+70°C

Symbol	Item	Test Conditions	Min.	Max.	Unit
tCDS	C/D̄ Set up time		100	—	nS
tCDH	C/D̄ Hold time		10	—	nS
tCE, tRD, tWR	CE̅, RD̅, WR̅ pulse width		80	—	nS
tDS	Data set up time		80	—	nS
tDH	Data hold time		40	—	nS
tACC	Access time		—	150	nS
tOH	Output hold time		10	50	nS

6. Font Characteristic

CGROM Font - 01

7. Reliability Test Conditions

No.	Test item	Test condition	Inspection after test
11.1	High temperature storage	80±2°C/120 hours	Note 1,2
11.2	Low temperature storage	-30±2°C/120 hours	
11.3	High temperature operating	70±2°C/120 hours	
11.4	Low temperature operating	-20±2°C/120 hours	
11.5	Temperature cycle	-20±2°C~25°C~70±2°C*10cycles (30min.)　(5min.)　(30min.)	
11.6	Damp proof test	60°C*90% RH/96 hours	
11.7	Vibration test	Frequency : 10Hz~55Hz~10Hz Amplitude : 1.5mm , X , Y , Z direction for total 3hours (Packing condition)	
11.8	Dropping test	Drop to the ground from 1m height, one time, every side of carton. (Packing condition)	
11.9	ESD test	Voltage : ±800V　R : 330Ω　C : 150pF Air discharge, 1 time	
Remark : Note 1: No condensation to be observed. Note 2: Conducted after 4 hours of storage at 25^{0}C, 0%RH.			

8. INSPECTION CRITERION

8.1 Objective

The LCM test criterion are set to formalize LCM quality standards for ODNA with reference to those of the customer for inspection, release and acceptance of finished LCM products in order to guarantee the quality of LCM products required by the customer.

8.2. Scope

The criterion is applicable to all the LCM products manufactured by ODNA.

8.3. Equipment for Inspection

Electrical tester, electrical testing machines, vernier calipers, microscopes, magnifiers, anti-static wrist straps, finger cots, labels, tri-phase cold and hot shock machine, constant temperature and humidity chamber, backlight table, ovens for high-low temperature experiments, refrigerators, constant voltage power supply (DC), desk Lamps, etc.

8.4. Sampling Plan and Reference Standards

8.4.1 Sampling plan :
Refer to National Standard GB/T 2828.1---2012/ISO2859-1:1999, level II of normal levels :
Major defect: AQL 0.4
Minor defect: AQL 1.0
8.4.2 GB/T 2828.1---2012/ISO2859-1:1999 Sampling check procedure in count
8.4.3 GB/T 18910. Standard for LCM parts
8.4.4 GB/T24213-2008   Basic Environmental Test Procedures for Electrical and Electronic Products
8.4.5 IPC-A-610E   Acceptability of Electronic Assemblies

8.5. Inspection Conditions and Inspection Reference

8.5.1 Cosmetic inspection: shall be done normally at 23±5℃ of the ambient temperature and 45~75%RH of relative humidity, under the ambient luminance between 500lux~1000lux and at the distance of 30cm apart between the inspector's eyes and the LCD panel and normally in reflected light. For backlight LCM, cosmetic inspection shall be done under the ambient luminance less than 100lux with the backlight on.
8.5.2 The LCM shall be tested at the angle of 45°left and right and 0-45° top and bottom as the following picture showing:
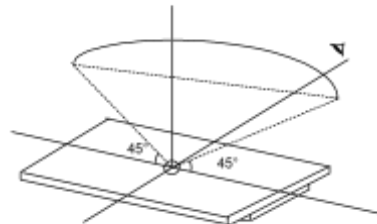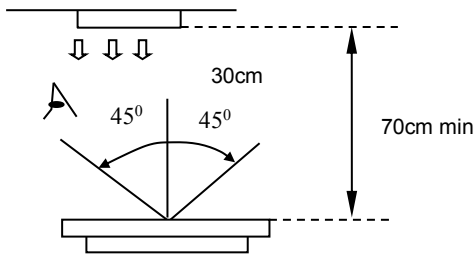
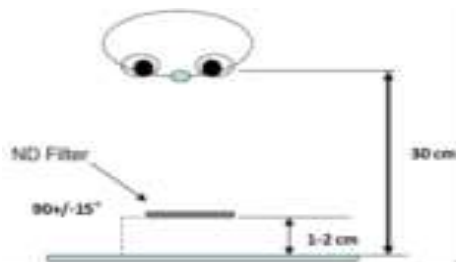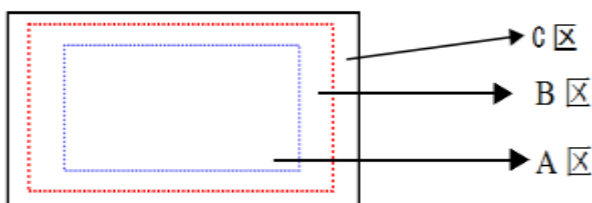8.5.3 Definition of viewing area(VA)
A area : Active area(AA area)
B area : Viewing area(VA area)
C area : Non-viewing area(not viewing after customer assembly)
If there is any appearance viewing defect which do not affect product quality and customer assembly in C area, it's accepted in generally.
The criteria apply to A and B area except chipping and crack.

8.5.4 Inspection with naked eyes(exclusive of the inspection of the physical dimensions of defects carried out with magnifiers)

8.5.5 ND card use method(refer to right conner image) and scope: Multi-bright dot; Mura(Black/Gray pattern uneven); dark line and so on.

8.5.6 Undefined items or other special items, refer to mutual agreement and limited sample.If criterion does not match product specifications/ technical requirement, both should be subject to special inspection criterion agreed by customer.
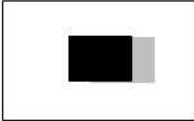
8.6. Defects and Acceptance Standards

8.6.1 Electrical properties test

8.6.1.1 Test voltage(V) : Refer to the instruction of testers and the product specification or drawing and the display content and parameters and display effects shall conform to the product specification and drawing.

8.6.1.2 Current Consumption(I) : Refer to approved product specifications or drawings.

8.6.1.3 Function items(Defect category : MA.)

No.	Defects	Descriptions	Pictures	Inspection method/tools	Defect category
8.6.1.3.1	No display /reaction	shows no picture/display in normal connected situation.		Naked eyes/ testers	MA.
8.6.1.3.2	Missing segment	Shows missing lines in normal display		Naked eyes/ testers	MA.
8.6.1.3.3	Dark line	Only visible on gray pattern, 1 or more vertical/horizontal lines:5%ND,not visible,OK	/	Naked eyes/ testers	MA.
8.6.1.3.4	POL angle defect	Not accepted		Naked eyes/ testers	MA.
8.6.1.3.5	Image retention (sticking)	Chess pattern stays for 30mins and change to 50% gray pattern,disappear time <10s, OK; if time>10s, NG		Naked eyes/ testers	MA.
8.6.1.3.6	Flicker	Refer to limit sample if essential or flicker value<-30dB(measured by CA310A); OK		Naked eyes/ CA310A	MA.
8.6.1.3.7	Display abnormal	Not accepted		Naked eyes/ testers	MA.
8.6.1.3.8	Cross-talk	Refer to limited sample		Naked eyes/ limited sample	MA.
8.6.1.3.9	Display dim/bright	Refer to limited sample	/	Naked eyes/ limited sample	MA.
8.6.1.3.10	Contrast	Refer to limited sample	/	Naked eyes/ limited sample	MA.
8.6.1.3.11	Huge current	Out of spec, not accepted	/	Ammeter	MA.

8.6.1.3.12	TP function defect	Not accepted	/	Naked eyes/ Touch/ test program	MA.

8.6.2 LCD dot/line defect
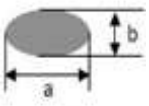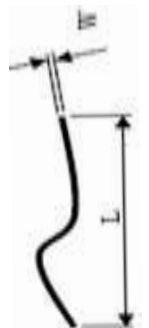
8.6.2.1 LCD pixel dot defect(defect category : MI.)
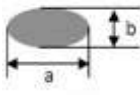
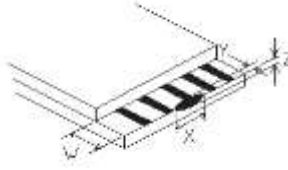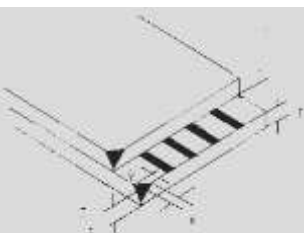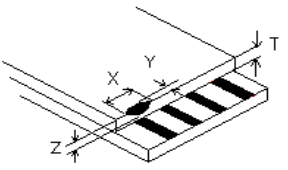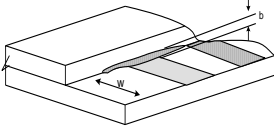| Item	Inspection criterion		
Size	S<5"	5"≤S<10"	10"≤S<15"
Color pixel dot defect(RGB dot)	1	2	2
2 connected bright dot	0	1	1
3 connected bright dot or more	0	0	1
Bright dot quantity	1	2	3
Random dark dot quantity	2	3	4
2 connected dark dot	1	1	2
3 connected dark dot or more	0	0	0
Dark dot quantity	3	4	5
Multi-bright dot	ND 3%hidden, OK		
Remark: 2 bright dots distance DS≥15mm 2 dark dots distance DS≥5mm			
1) Bright dot: Power on LCM and RGB dot in black display			
2) Dark dot: Power on LCM and gray or black dot in RGB display			
3) Multi-bright dot: Power on LCM and fluorescent tiny dot in black display(only visible in black display)			

8.6.2.2 LCD appearance dot defect (defect category : MI.)

No.	Item	Inspection criterion				Picture	Inspection method/tools
		Size	S<5"	5"≤S<10"	10"≤S<15"		
8.6.2.2.1	Dot defect (black dot, white dot)	D≤0.15	Not count	Not count	D≤0.2mm Not count	D=(a+b)/2	Naked eyes /film card /magnifier
		0.15<D≤0.25	3	3			
		0.25<D≤0.30	1	2	0.2~0.35mm Q'ty ≤ 4		
		0.30<D≤0.35	0	1			
		0.35<D≤0.50	0	0	1		
		D>0.5	0	0	0		
		Remark : D≤0.15mm, not count.Multi-dot as bulk is not accepted. Count dot quantity≤ 5 2 round dots or linear dots in 1 cm is judged as multi-dot.					
8.6.2.2.2	Line defect (visible when power on)	Length (mm)	Width (mm)	S<5"	5"≤S<10"	10"≤S<15"	
		Not count	W≤0.03	Accepted	Accepted	Accepted		Naked eyes /film card /magnifier
		L≤5	0.03≤W<0.05	3	3	Not count		
		L≤5	0.05≤W<0.08	0	1	3		
		L≤8	0.05≤W<0.08	0	0	1		
		L>8	W>0.08	0				
		Remark : Invisible when power on,only visible in special angle against light, show as watermark/folding/scratch but can not be touched, no control or refer to keeping sample.						

8.6.2.2.3	Polarizer convex-concave dot defect, polarizer bubble defect	Size(mm)	S<5"	5"≤S<10"	10"≤S<15"		Naked eyes /film card /magnifier
		D≤0.20	Not count	Not count	Not count		
		0.20<D≤0.5	2	2	3		
		0.50<D≤0.8	0	1			
		0.8<D≤1.5	0	0	1		
		D>1.5mm	0	0	0		

8.6.3 Chipping defect

No.	Item	Accepted criterion(mm)				MA.	MI.
8.6.3.1	ITO conductive side	X	/	≤1/8L	/		√
		Y	Y≤1/6W	1/6W <Y≤1/4W	1/4W <Y		
		Accept	2	2	0		
8.6.3.2	Corner chipping (ITO pins position)	X	/	≤1/6L	/		√
		Y	Y≤1/2W	1/2W <Y≤W	W <Y		
		Accept	2	1	0		
		Corner chipping occurred in sealed edge position as per 6.3.3; at the same time it should not enter into black border of the frame and the corner chipping effect the electric connection position perform as per 6.3.1.					
8.6.3.3	Chipping in sealed area (outside chipping)	X	/	≤1/8L	/		√
		Y(outside chipping)	Not enter into sealant	Enter Y≤H	H<Y		
		Y(inside chipping)		Enter Y≤1/2H	1/2H<Y		
		Z	≤T	≤1/2T	/		
		Accept	2	1	0		
	Chipping in sealed area (inside chipping)	The standards of inner and outer chipping on edge sealing area are same. When the chipping occurred in the opposite of stage, Y as per the chipping on the non-conduction side standard in 6.3.1					
8.6.3.4	Conductive side (back side chipping)	X	/	≤1/6L	/		√
		Y	Y≤1/3W	1/3W <Y≤2/3W	2/3W <Y		
		Accept	2	2	0		
		Chipping into ITO side, refer to 6.3.1					

		X	/	≤1/8L	/		
8.6.3.5	Protruding LCD poor cutting and LCD burrs	Y	≤1/6W	1/6W <Y≤1/5W	1/5W <Y		√
		Z	/	/	/		
		Accept	1	1	1		
		The outside protruding control as per the tolerance of drawing.					
8.6.3.6	Crack	Not allow to occur cracks without direction; the crack expand to inside is NG, but to outside is OK (confirmed as per the damaged standard)					√

Remark :

X means the length of chipping;

Y means the width;

Z means the thickness;

W means the step width of the two glasses;

H means the distance from the glass edge to the sealant inner edge;

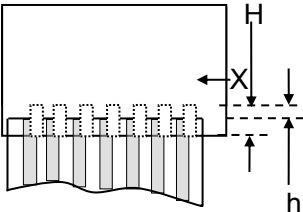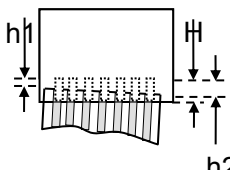T means glass thickness.

8.6.4 Backlight components

No.	Item	Description	Accepted criterion	MA.	MI.
8.6.4.1	No backlight wrong Color	/	Rejected	√	
8.6.4.2	Color deviation	When powered on, the LCD color differs from its sample and found that the color not conforming to the drawing after testing.	Refer to sample and drawing		√
8.6.4.3	Brightness deviation	When powered on, the LCD brightness differs from its sample and is found after testing not conforming to the drawing; or if it conforms to the drawing but the brightness over ±40% than its typical value.	Refer to sample and drawing		√
8.6.4.4	Uneven brightness	Uneven on the same LCD and out of the specification of the drawing. The no specification evenness= (the max value-the min value)/ mean value< 70%.	Refer to sample and drawing		√
8.6.4.5	Spot/line/ scratch	When power on, it has dirty spot, scratches and so on spot and line defects.	Refer to 6.2.2		√

8.6.5 Metal frame (Metal Bezel)

No.	Item	Description	Accepted criterion	MA.	MI.
8.6.5.1	Material & surface treatment	Metal frame/surface treatment do not conform to the specifications.	Rejected	√	

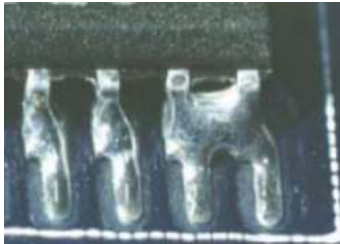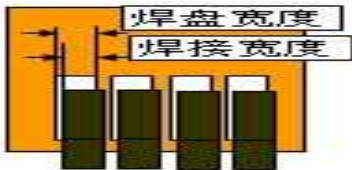| No.	Item	Description	Accepted criterion	MA.	MI.
8.6.5.2	Tab twist Unconformity /Tab not twisted	Wrong twist method or direction and twist tabs are not twisted as required.	Rejected	√	
8.6.5.3	Bezel paint loss	1.Front surface : Paint peel off and scratch to the bottom Dot:D≤0.5mm, exceeds 3; Line:L≤3.0mm,W≤0.05mm exceeds 2; 2.Front dent, air bubble and side with paint peeling off scratch to the bottom Dot: D≤1.0mm, exceeds 3; Line:L≤3.0mm,W≤0.05mm, exceeds 2;	Rejected		√
8.6.5.4	Bezel scratch				√
8.6.5.5	Painting peel off, discoloration, dent, and scratch				√
8.6.5.6	Burr	Burr(s) on metal bezel is so long as to get into viewing area.	Rejected		√

8.6.6 FPC

No.	Item	Description	Accepted criterion	MA.	MI.
8.6.6.1	Model &P/N	Material model & P/N	Keep the same with drawing and technical requirement	√	
8.6.6.2	Dimension/ position	Dimension in drawing spec H X h Remark: H=ITO pin length f=FPC width W=ITO pin width	f≤1/3w, h ≤1/3H, dimension in drawing spec-> OK Conducive material and ITO/PDA connective area must over than 1/2. Entire dimension must be in spec tolerance. h1 h2		√
8.6.6.3	FPC appearance	Hot pressing material get broken, folding line open; FPC golden finger oxidate, broken ,scratch ,foreign material which cause line short	Broken length<2mm; FPC line is OK- > Accepted Crack and line broken->Rejected		√
8.6.6.4	FPC burr	Burr near FPC edge area	When cover line and burr length ≤1.0mm->Accepted		√
8.6.6.5	FPC falling off	FPC bonding area falling off ; silica gel breaking	Rejected		√

No.	Item	Description	Accepted criterion	MA.	MI.
8.6.6.6	Sealant missing ITO line	Sealant is not covered all ITO line	Rejected	√	
8.6.6.7	Missing sealant	No sealant	Rejected	√	
8.6.6.8	Sealant	Sealant height ->product total height	Rejected	√	

8.6.7 SMT

No.	Item	Description	Accepted criterion	MA.	MI.
8.6.7.1	Soldering bridge	Solder between adjacent pads and components 	Rejected		√
8.6.7.2	Solder ball/splash	Solder ball/tin dross causing short circuit at the solder point. There are active solder ball and splash.	Rejected		√
8.6.7.3	Soldering excursion	Soldering slant > 1/3 soldering pad 	Rejected		√
8.6.7.4	Component wrong attaching	Component on PCB differs with drawing: wrong one, extra one,lack one,opposite polarity	Rejected	√	
		JUMP short circuit on PCB: extra soldering ,lack soldering.	Rejected	√	
8.6.7.5	Component falling off	Soldering but component is missing	Rejected	√	
8.6.7.6	Wrong component	Component model/spec differs from product specification	Rejected	√	

8.6.8 General Appearance

No.	Item	Description	Accepted criterion	MA.	MI.
8.6.8.1	Dimension	According to drawing	Accepted	√	
8.6.8.2	Surface stain	Defect mark or label are not removed residual glue, and finger print,etc;	Rejected		√
8.6.8.3	Assembly foreign material	Dot/linear stain after assembly backlight and diffuse film TP assembly fogy stain	Invisible when power on->OK Refer to 6.2.2 dot/line spec		√
8.6.8.4	Mixture	Different model product in the same shipment	Rejected	√	
8.6.8.5	Product mark	Missing, unclear, incorrect, or misplaced part	Rejected		√
8.6.8.6	Component mark	Silk screen mark clear, resistance measured value in spec	Accepted (Refer to customer special requirement)		√

8.6.8.7	Newton's rings	Area<1/6 screen area quantity≤1	Accepted		√
8.6.8.8	Mura	1.In black display ND 3% invisible ->OK; visible->NG 2.Naked eyes inspection RGB display invisible Black display, area<1/4 screen area	Refer to limited sample		√
8.6.8.9	Light leak	1.LCD edge(near backlight) shadow by LCD lamps irregular illuminate 2.Judge in black/white/gray display (slight leaky is yellowish,greenish, blueish ->NG); Tape 浮起漏光 Panel 側邊漏光	Refer to limited sample		√
8.6.8.10	Polarizer	1.Polarizer slant.Cover VA and not over LCD edge 2.No unmovable stain or finger print in polarizer VA 3.Bubble/warped but not enter VA	Accepted		√
8.6.8.11	TP defect	1.TP crack 2.TP stain(fogy& unremovable) 3.TP glue overflow to VA	Rejected		√

Remark :
Anything which is not clearly defined in 6.5~6.8 should refer to IPC-A-610E.Consumer Electronics, Non-consumer Electronics refer to Ⅰ grade and Industrial,Automobile refer to Ⅱgrade.

8.7 Others
Items not specified in this document or released on compromise should be inspected with reference
to mutual agreement and limit samples.

9. HANDLING PRECAUTIONS

9.1 Mounting method

The LCD module consists of two thin glass plates with polarizes which easily be damaged. And since the module in so constructed as to be fixed by utilizing fitting holes in the printed circuit board.

Extreme care should be needed when handling the LCD modules.

9.2 Caution of LCD handling and cleaning

When cleaning the display surface, Use soft cloth with solvent

[recommended below] and wipe lightly :

●.Isopropyl   alcohol

●.Ethyl alcohol

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.

Do not use the following solvent :

●.Water

●.Aromatics

Do not wipe ITO pad area with the dry or hard materials that will damage the ITO patterns

Do not use the following solvent on the pad or prevent it from being contaminated :

●.Soldering flux

●.Chlorine (CI) , Sulfur (S)

If goods were sent without being silicon coated on the pad, ITO patterns could be damaged due to the corrosion as time goes on.

If ITO corrosion happen by miss-handling or using some materials such as Chlorine (CI), Sulfur (S) from   customer, Responsibility is on customer.

9.3 Caution against static charge

The LCD module use C-MOS LSI drivers, so we recommended that you :

Connect any unused input terminal to Vdd or Vss, do not input any signals before power is turned on, and ground your body, work/assembly areas, assembly equipment to protect against static electricity.

9.4 Packing

Module employ LCD elements and must be treated as such.

●.Avoid intense shock and falls from a height.

●.To prevent modules from degradation, do not operate or store them exposed direct to sunshine or high temperature/humidity.

9.5 Caution for operation

●.It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage then the limit cause the shorter LCD life.

●.An electrochemical reaction due to direct current causes LCD's undesirable deterioration, so that the use of direct current drive should be avoided.

●.Response time will be extremely delayed at lower temperature then the operating temperature range and on the other hand at higher temperature LCD's how dark color in them. However those phenomena do not mean malfunction or out of order with LCD's, which will come back in the specified operation temperature.

●.If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.

●.A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open   circuit.

●.Usage under the maximum operating temperature, 50%Rh or less is required.

●.When fixed patterns are displayed for a long time,remnant image is likely to occur.

9.6 Storage

In the case of storing for a long period of time for instance, for years for the purpose or replacement use, the following ways are recommended.

●.Storing in an ambient temperature 10°C to 30°C, and in a relative humidity of 45% to 75%. Don't expose to sunlight or fluorescent light.

●.Storing in a polyethylene bag with the opening sealed so as not to enter fresh air outside in it . And with no desiccant.

●.Placing in a dark place where neither exposure to direct sunlight nor light's keeping the storage temperature range.

●.Storing with no touch on polarizer surface by the anything else.

It is recommended to store them as they have been contained in the inner container at the time of delivery from us.

9.7 Safety

●.It is recommendable to crash damaged or unnecessary LCD's into pieces and wash off liquid crystal by either of solvents such as acetone and ethanol, which should be burned up later.

●.When any liquid leaked out of a damaged glass cell comes in contact with your hands, please wash it off well with

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soap and water.

10. PRECAUTION FOR USE

10.1 A limit sample should be provided by the both parties on an occasion when the both parties agreed its necessity. Judgment by a limit sample shall take effect after the limit sample has been established and confirmed by the both parties.

10.2 On the following occasions, the handing of problem should be decided through discussion and agreement between responsible of the both parties.

●.When a question is arisen in this specification.

●.When a new problem is arisen which is not specified in this specifications.

●.When an inspection specifications change or operating condition change in customer is reported to ODNA, and some problem is arisen in this specification due to the change.

●.When a new problem is arisen at the customer's operating set for sample evaluation in the customer site.

11. PACKING SPECIFICATION

---TBD

12.Mechanical Drawing (Unit mm, Un-tolerated ±0.3mm)

240X128 DOTS

VIEWING DIRECTION

CON1 CON2

*79.8
63.64(V.A)
59.13(A.A)
9.1
8.08
19.41
10.1
5.4
3
*144±0.5
*138
*133.2
113(V.A)
110.88(A.A)
18.65
2.5
P2.54*21=53.34
22-Φ1
22 22
22-Φ1
P2.54*21=53.34
15
97
3.5
4-Φ3.5
*104±0.5
1.6
*14.7MAX
*9.7

CON1=22PIN

PIN No.	SYMBOL
1	FG
2	VSS
3	VDD
4	NC
5	/WR
6	/RD
7	/CE
8	C/D
9	NC
10	/RST
11	DB0
12	DB1
13	DB2
14	DB3
15	DB4
16	DB5
17	DB6
18	DB7
19	FS
20	NC
21	NC/LED PWM
22	NC

CON2=22PIN

PIN No.	SYMBOL
1	FG
2	VSS
3	VDD
4	NC
5	/WR
6	/RD
7	/CE
8	C/D
9	NC
10	/RST
11	DB0
12	DB1
13	DB2
14	DB3
15	DB4
16	DB5
17	DB6
18	DB7
19	FS
20	NC
21	NC/LED PWM
22	NC

ITEM	PARAMETERS		ITEM	PARAMETERS
DISPLAY TYPE	Mono TFT(TN/WHITE,TRANSMISSIVE)		VIEWING DIRECTION	6 O'CLOCK
FONT & BACKGROUND COLOR	Font:BLACK,Background:YellowGreen		OPERATING TEMPERATURE	−20°C TO +70°C
LOGIC VOLTAGE(VDD)	5.0V		STORAGE TEMPERATURE	−30°C TO +80°C
CONTRAST RATIO	500(TYP.)		IC	UC16963(FONT−01)

MARK"*"ARE IMPORTANT DIMENSIONS,MARK"*"ARE SPECIAL CHARACTERISTICS,MARK"○"ARE REFERENCE DIMENSIONS,MARK"☆"ARE IMPORTANT CHARACTERISTICS IRRELEVANT TO SAFETY,MARK"●"ARE IMPORTANT CHARACTERISTICS RELATED TO SAFETY,MARK"◇"
ARE SPECIAL CHARACTERISTICS IRRELEVANT TO SAFETY,MARK"●"ARE IMPORTANT CHARACTERISTICS EXCEPT FOR THE SPECIAL CHARACTERISTICS.

REV.|SYMBOL	DESCRIPTION		NAME	DATE
0	FIRST ISSUE			2018−11−30

RoHS COMPLIANT YES
UNMARKED TOLERANCE ±0.3
SCALE FIT UNIT mm
SHEET 1 OF 1 REV. 0
TITLE LCM
PART NO. AFM240128D0−4.8N6NTM
MODULE NO. AFM240128D0−4.8N6NTM
CUSTOMER NO.

DRAWN / NAME / DATE
CHECKED
APPROVED

ORIENT DISPLAY