LITE ARRAY OLED (BVI) CO. LTD.

MODULE NO.: LPST128128A00-T4
DOC.REVISION: 1.0

	SIGNATURE	
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PRODUCT PREVIEW

Product Part#:	**LPST128128A00-T4**
Product Name:	**262k color OLED Module**
Revision:	**1.0**
Date:	**Jun'2005**

REVISION RECORD

Revision	Description of Revision	Revision date	Remark
0.0	Initial release	28-Feb-05	--
1.0	Panel thickness	9-Jun-05	

TABLE OF CONTENTS

1. FUNCTIONS & FEATURES

1.1. Format	: 128(RGB)*128 dots
1.2. Display mode	: Passive Matrix
1.3. Display color	: 262k color
1.4. Duty	: 1/128

2. MECHANICAL SPECIFICATIONS

2.1. Module size	: 36.0mm(W)*50mm(H)
2.2. Panel size	: 36.0mm(W)*36.0mm(H)
2.3. Viewing area	: 28.856mm(W)*28.856mm(H)
2.4. Active area	: 26.856mm(W)*26.856mm(H)
2.5. Dot pitch	: 0.210mm(W)*0.210mm(H)
2.6. Dot size	: 0.186mm(W)*0.186mm(H)
2.7. Thickness(with polarizer)	: 1.65mm
2.8. Weight	: TBD

3. BLOCK DIAGRAM

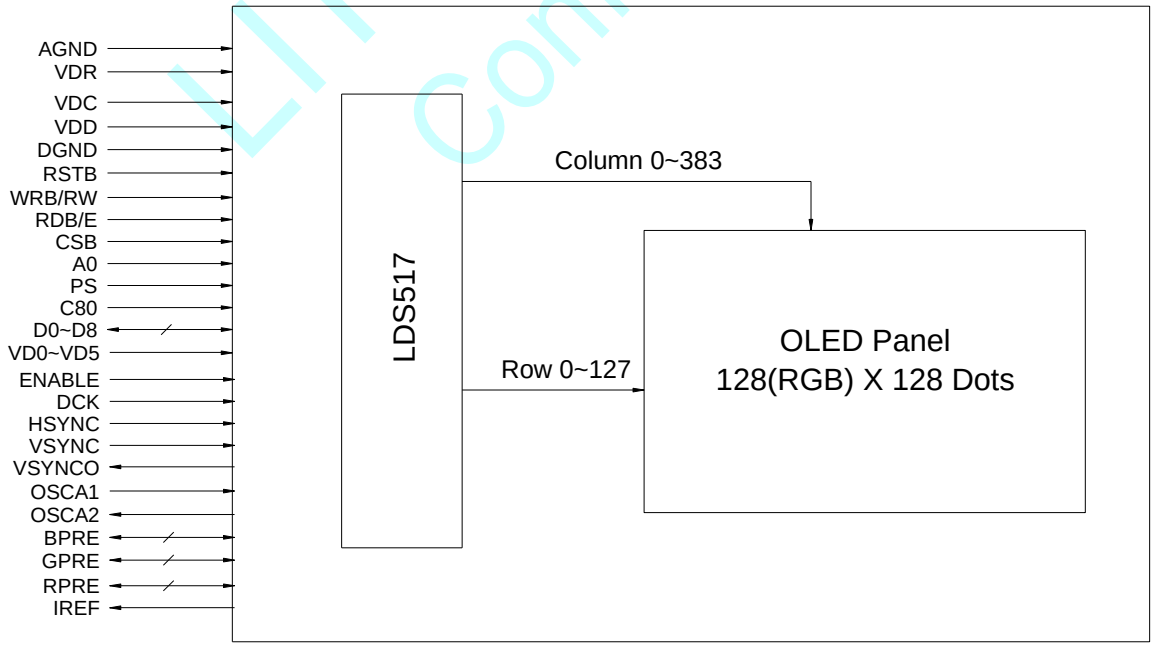


Figure 1: Block diagram

4. DIMENSIONAL OUTLINE

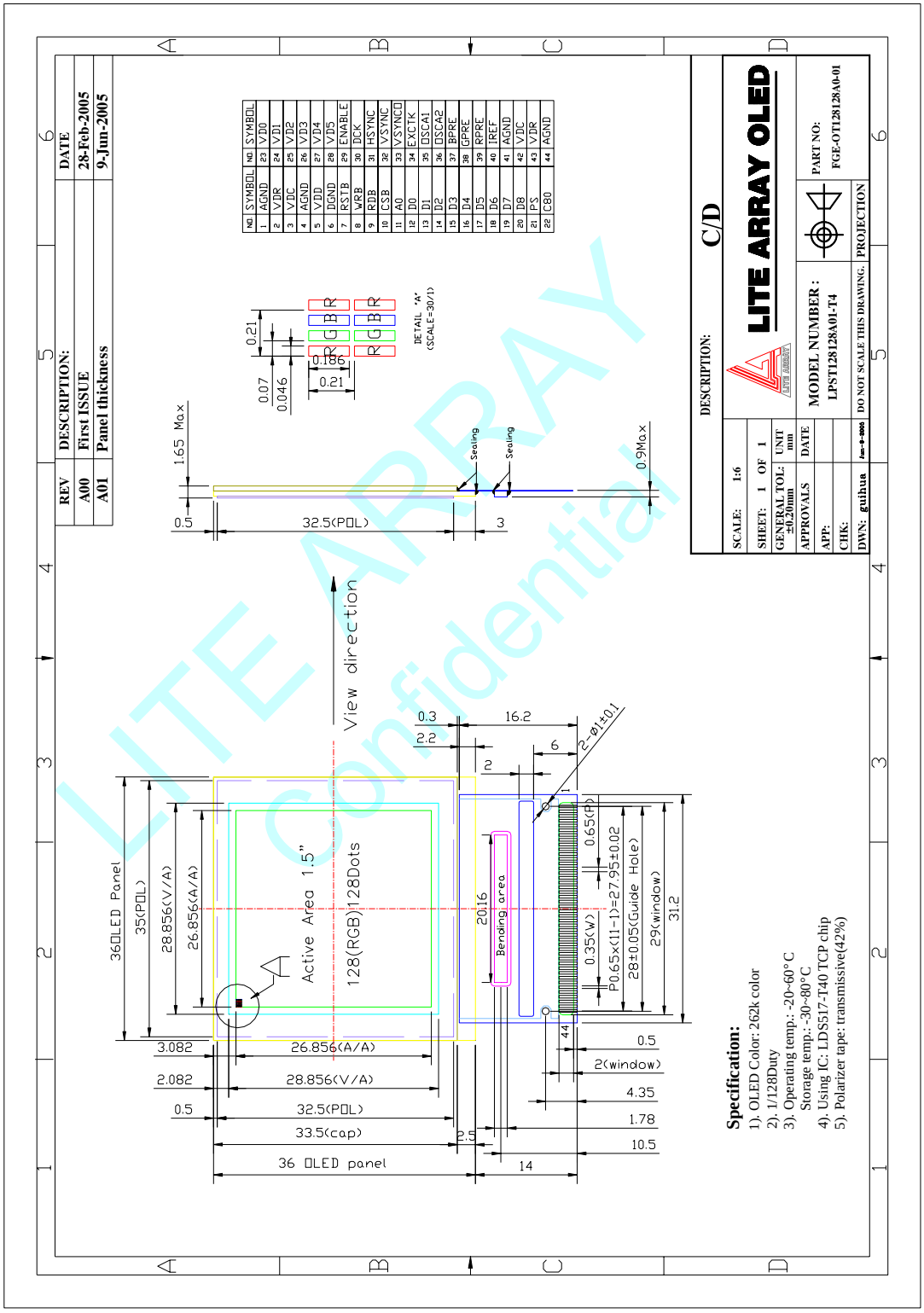


Figure 2: Dimensional outline

5. PIN DESCRIPTION

Pin no.	Symbol	Function
1,4,41,44	AGND	Analog (Driver) GND
2,43	VDR	OLED Dot Matrix Power Supply for Row Driver
3,42	VDC	OLED Dot Matrix Power Supply for Column Driver
5	VDD	Logic Power Supply
6	DGND	Logic GND
7	RSTB	Reset (Active Low)
8	WRB/RW	Write (Active Low, 80 interface) H: Read L: Write (60 interface)
9	RDB/E	Read (Active Low, 80 interface) Enable (60 interface)
10	CSB	Chip Select (Active Low)
11	A0	Address A0 (L: command, H: Parameter)
12	D0	MPU Data [0] or Serial Clock
13	D1	MPU Data [1] or Serial Data
14~20	D2~D8	Data Bus
21	PS	H: Parallel interface, L: Serial interface
22	C80	H: 68-series CPU, L: 80-series CPU
23~28	VD0-VD5	RGB interface data bus 6-bit interface: VD [5:0]
29	ENABLE	RGB interface VD [5:0] data enable input pin (Active Low)
30	DCK	RGB interface Dot clock input pin (Rising edge)
31	HSYNC	RGB interface horizontal sync input pin (Active Low)
32	VSYNC	RGB interface vertical sync input pin (Active Low)
33	VSYNCO	RGB interface vertical sync output pin (Active Low)
34	EXCTK	Refer to IC datasheet
35	OSCA1	Oscillator for Dot Matrix
36	OSCA2	
37	BPRE	Pre-Charge Voltage for Blue
38	GPRE	Pre-Charge Voltage for Green
39	RPRE	Pre-Charge Voltage for Red
40	IREF	Current Setting. Typ Resistance = 39 kΩ (Current adjustable range ±30%)

Table1: Pin Description

6. ABSOLUTE MAXIMUM RATINGS

6.1 Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V_{DD}	-0.3	4.0	V
	V_{DC}	-0.3	23.0	V
	V_{DR}			
Input voltage	V_{IN}	-0.3	V_{DD}+0.3	V
Out voltage	V_{OUT}	-0.3	V_{DD}+0.3	V
Operating Temperature	T_{OP}	-40	85	^{o}C
Storage Temperature	T_{STG}	-50	100	^{o}C

Table2: Absolute Maximum Ratings

7. OPTICS & ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Conditions	Min	Typ	Max	Unit
Brightness (White)	L_{br}	Display average (With polarizer)	30	50	70	Cd/m^2
CIE (Blue)	X	With polarizer	0.101	0.151	0.201	--
	Y		0.120	0.170	0.220	--
CIE (Green)	X		0.245	0.295	0.345	--
	Y		0.594	0.644	0.694	--
CIE (Red)	X		0.588	0.638	0.688	--
	Y		0.308	0.358	0.408	
CIE (White)	X		0.220	0.270	0.320	--
	Y		0.270	0.320	0.370	--
Dark Room Contrast	CR		200	--	--	--
View Angle	A	--	>160	--	--	degree

Table 3: Optics & electrical characteristics

8. ELECTRICAL CHARACTERISTICS

8.1 DC Characteristics

(VSS = 0V, VDD = 1.65 to 2.0V /2.3 to 3.3V, Ta = 25 °C)

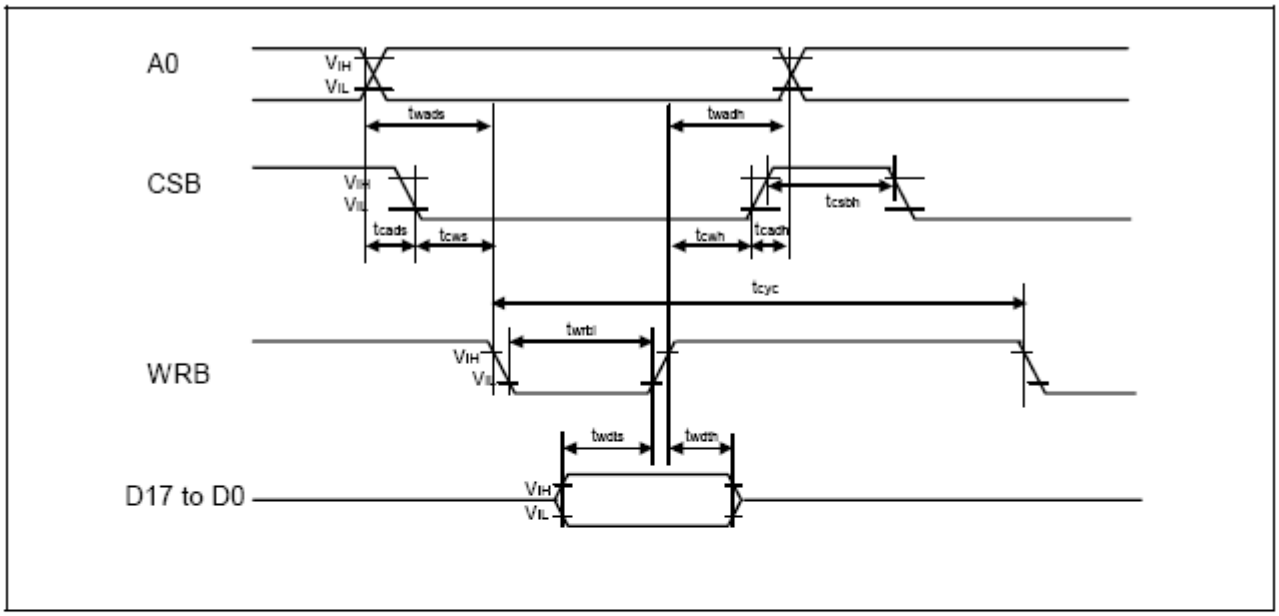
Symbol	Item	Test Condition	Min	Typ	Max	Unit
V_{DD}	Logic operating voltage	-	1.65	1.8	2.0	V
			2.3	2.8	3.3	V
V_{DC}	Column operating voltage	-	10	15	21.0	V
V_{DR}	Row operating voltage	-	10	15	21.0	V
V_{IH}	High logic input voltage	-	$0.7V_{DD}$	-	V_{DD}	V
V_{IL}	Low logic input voltage	-	V_{SS}	-	$0.3V_{DD}$	V
V_{OH}	High logic output voltage	I_{OH}= -0.1mA	$0.85V_{DD}$	-	V_{DD}	V
V_{OL}	Low logic output voltage	I_{OL}= +0.1mA	V_{SS}	-	$0.15V_{DD}$	V
I_{IL}	Input leakage voltage	V_{IN} =V_{DD} or V_{SS}	-1.0	-	+1.0	µA
Fosc	Oscillator frequency for Dot matrix	V_{DD} =2.8V	2.7	3	3.3	MHz
I_{FC}	Forward current	All pixels on	-	23	-	mA
V_{FV}	Forward voltage	-	-	18	-	V
P_{wr}	Power consumption	30% ON, 50cd/m^2	-	<130	-	mW

Table 4: DC characteristics

NOTICE:
*1) Applies to PS, C80, RSTB, A0, CSB, WRB, RDB, and D17 toD0 pins.
*2) Applies to D17 to D0 pins

8.2 AC Characteristics

8.2.1 Write Characteristics

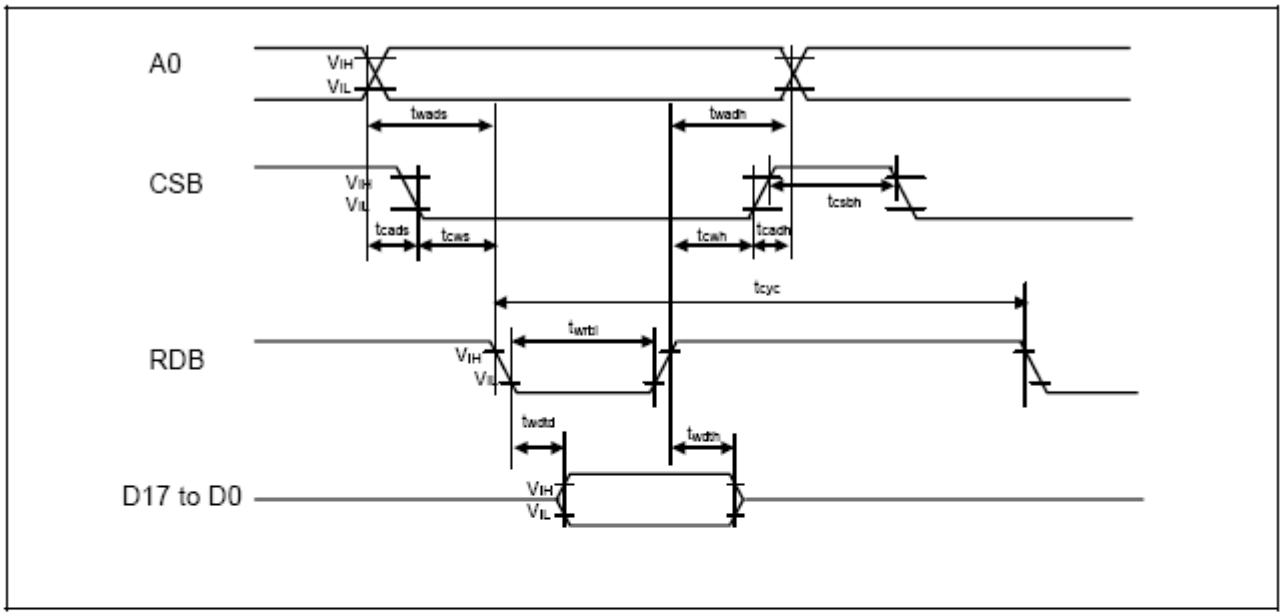


(VDD = 1.8V/2.8V, Ta = 25 °C)

Symbol	Parameter	Conditions	Related Pins	MIN	TYP	MAX	Unit
t_{cyc}	Write cycle time	-	WRB	100	-	-	ns
t_{cads} t_{cadh}	Address and Select setup time Address and Select hold time	-	CSB,A0	0 0	- -	- -	ns
t_{wads} t_{wadh}	Address setup time Address hold time	-	A0	50 20	- -	- -	ns
t_{cws} t_{cwh}	Select setup time Select hold time	-	CSB	10 10	- -	- -	ns
t_{wrbl}	Write Low pulse width	-	WRB	30	-	-	ns
t_{csbh}	Select High pulse width	-	CSB	10	-	-	ns
t_{wdts} t_{wdth}	Data setup time Data hold time	-	D17 to D0	10 20	- -	- -	ns

Figure 3: Write Characteristics

8.2.2 Read Characteristics



(VDD = 1.8V/2.8V, Ta = 25 °C)

Symbol	Parameter	Conditions	Related Pins	MIN	TYP	MAX	Unit
t_{cyc}	Read cycle time	-	RDB	500	-	-	ns
t_{cads} t_{cadh}	Address and Select setup time Address and Select hold time	-	CSB,A0	0 0	- -	- -	ns
t_{rads} t_{radh}	Address setup time Address hold time	-	A0	50 20	- -	- -	ns
t_{crs} t_{crh}	Select setup time Select hold time	-	CSB	10 10	- -	- -	ns
t_{rdbl}	Read Low pulse width	-	RDB	250	-	-	ns
t_{csbh}	Select High pulse width	-	CSB	10	-	-	ns
t_{rdtd} t_{rdth}	Data output delay time Data output hold time	CL = 100pF	D17 to D0	- 5	- -	200 -	ns

Figure 4: Read Characteristics

9. CONTROL AND DISPLAY COMMAND

9.1 Main command

"-": Don't care

Instruction	W/R	A0	D17 - D6	D5	D4	D3	D2	D1	D0	Function	Default
Software_Reset											
SWRESET	W	L	-	01h						Display Off	-
Dot_Matrix_Display_On/Off											
DDISPONOFF	W	L	-	02h						Dot Matrix Display ON/OFF	-
1st parameter	W	H	-	0	0	0	0	0	D0	D0=0:Display Off, D0=1:Display On	00h
Dot_Matrix_Stand-By_On/Off											
DSTBYONOFF	W	L	-	03h						Dot Matrix Stand-By ON/OFF	-
1st parameter	W	H	-	0	0	0	0	0	D0	D0=0:OSCA start, D0=1:Run DDISPOFF,OSCA stop	01h
Dot_Matrix_Frame_Frequency											
DFRAME	W	L	-	04h						Dot Matrix Frame frequency set	-
1st parameter	W	H	-	-	-	-	F2	F1	F0	60 ~ 150 Hz	02h
Data_Write_Control											
WRITEDIR	W	L	-	05h						Data Write Control	-
1st parameter	W	H	-	-	-	D3	D2	D1	D0	D2=0;Horizontal, D2=1:Vertical	00h
Display_Direction											
DISPDIR	W	L	-	06h						Display Direction Control	-
1st parameter	W	H	-	-	-	-	-	DV	0	Display direction	00h
Display_Size											
DISPSIZE	W	L	-	07h						Display Size Set	-
1st parameter	W	H	-	-	-	-	FX6	FX5	FX4	Display Size X From	00h
2nd parameter	W	H	-	-	-	FX3	FX2	FX1	FX0		00h
3rd parameter	W	H	-	-	-	-	TX6	TX5	TX4	Display Size X to	07h
4th parameter	W	H	-	-	-	TX3	TX2	TX1	TX0		0Fh
5th parameter	W	H	-	-	-	-	FY6	FY5	FY4	Display Size Y From	00h
6th parameter	W	H	-	-	-	FY3	FY2	FY1	FY0		00h
7th parameter	W	H	-	-	-	-	TY6	TY5	TY4	Display Size Y to	07h
8th parameter	W	H	-	-	-	TY3	TY2	TY1	TY0		0Fh
MPU_Interface_Mode											
IFMODE	W	L	-	08h						6/9/18 Bit Interface Select	-
1st parameter	W	H	-	-	-	-	D2	D1	D0	"000" : 6-bit, "001" : 8-bit "010" : 9-bit "011" : 16-bit "100" : 18-bit	00h
Data_Reverse_Color_Masking											
DATAMASK	W	L	-	09h						Data Reverse & Color Masking	-
1st parameter	W	H	-	-	RV	-	R	G	B	RV=0:Origin, RV=1:Reverse	07h

Instruction	W/R	A0	D17 - D6	D5	D4	D3	D2	D1	D0	Function	Default
Data_R/W_Box_Size											
RWBOXSIZE	W	L	-	0Ah						R/W Box Set	-
1st parameter	W	H	-	-	-	-	XS6	XS5	XS4	R/W Box Column Start Address	00h
2nd parameter	W	H	-	-	-	XS3	XS2	XS1	XS0		00h
3rd parameter	W	H	-	-	-	-	XE6	XE5	XE4	R/W Box Column End Address	07h
4th parameter	W	H	-	-	-	XE3	XE2	XE1	XE0		0Fh
5th parameter	W	H	-	-	-	-	YS6	YS5	YS4	R/W Box Row Start Address	00h
6th parameter	W	H	-	-	-	YS3	YS2	YS1	YS0		00h
7th parameter	W	H	-	-	-	-	YE6	YE5	YE4	R/W Box Row End Address	07h
8th parameter	W	H	-	-	-	YE3	YE2	YE1	YE0		0Fh
Memory_Read_Start_Address											
DISPSTART	W	L	-	0Bh						Memory Read Start Set	-
1st parameter	W	H	-	-	-	-	XS6	XS5	XS4	Memory Read Column Start Address	00h
2nd parameter	W	H	-	-	-	XS3	XS2	XS1	XS0		00h
3rd parameter	W	H	-	-	-	-	YS6	YS5	YS4	Memory Read Row Start Address	00h
4th parameter	W	H	-	-	-	YS3	YS2	YS1	YS0		00h
Data_Write											
DATARW	W	L	-			0Ch				Dot Matrix Data Write	
18-bit Mode (262k color)	W	H	R5 R4 R3 R2 R1 R0 G5 G4 G3 G2 G1 G0			B5	B4	B3	B2	B1	B0	1st Data	
	:	:	: : : : : : : : : : : :			:	:	:	:	:	:		
	W	H	R5 R4 R3 R2 R1 R0 G5 G4 G3 G2 G1 G0			B5	B4	B3	B2	B1	B0	Nth Data	
16-bit Mode (65k color)	W	H	- R4 R3 R2 R1 R0 G5 G4 G3 G2 G1			G0	B4	B3	B2	B1	B0	1st Data	
	:	:	: : : : : : : : : :			:	:	:	:	:	:		
	W	H	- R4 R3 R2 R1 R0 G5 G4 G3 G2 G1			G0	B4	B3	B2	B1	B0	Nth Data	
9-bit Mode (262k color)	W	H	-	R5	R4	R3	R2	R1	R0	G5	G4	G3	1st Data	
	W	H	-	G2	G1	G0	B5	B4	B3	B2	B1	B0		
	:	:	:	:	:	:	:	:	:	:	:	:		
	W	H	-	R5	R4	R3	R2	R1	R0	G5	G4	G3	Nth Data	
	W	H	-	G2	G1	G0	B5	B4	B3	B2	B1	B0		
8-bit Mode (65k color)	W	H	-		R4	R3	R2	R1	R0	G5	G4	G3	1st Data	
	W	H	-		G2	G1	G0	B4	B3	B2	B1	B0		
	:	:	:		:	:	:	:	:	:	:	:		
	W	H	-		R4	R3	R2	R1	R0	G5	G4	G3	Nth Data	
	W	H	-		G2	G1	G0	B4	B3	B2	B1	B0		
6-bit Mode (262k color)	W	H	-			R5	R4	R3	R2	R1	R0	1st Data	
	W	H	-			G5	G4	G3	G2	G1	G0		
	W	H	-			B5	B4	B3	B2	B1	B0		
	:	:	:			:	:	:	:	:	:		
	W	H	-			R5	R4	R3	R2	R1	R0	Nth Data	
	W	H	-			G5	G4	G3	G2	G1	G0		
	W	H	-			B5	B4	B3	B2	B1	B0		

Instruction	W/R	A0	D17 - D6	D5	D4	D3	D2	D1	D0	Function	Default
Data_Read											
DATARW	W	L	-			0Ch				Dot Matrix Data Read	
18-bit Mode	R	H	X X X X X X X X X X	X	X	X	X	X	X	Dummy Data	
	R	H	R5 R4 R3 R2 R1 R0 G5 G4 G3	G2	G1	G0	B5	B4	B3	1st Data	
	:	:	: : : : : : : : : :	:	:	:	:	:	:		
	R	H	R5 R4 R3 R2 R1 R0 G5 G4 G3	G2	G1	G0	B5	B4	B3	Nth Data	
9-bit Mode	R	H	-	X	X	X	X	X	X	Dummy Data	
	R	H	-	R5	R4	R3	R2	R1	R0	1st Data	
	R	H	-	G2	G1	G0	B5	B4	B3		
	:	:	:	:	:	:	:	:	:		
	R	H	-	R5	R4	R3	R2	R1	R0	Nth Data	
	R	H	-	G2	G1	G0	B5	B4	B3		
6-bit Mode	R	H	-			X	X	X	X	Dummy Data	
	R	H	-			R5	R4	R3	R2	1st Data	
	R	H				G5	G4	G3	G2		
	R	H	-			B5	B4	B3	B2		
	:	:	:			:	:	:	:		
	R	H	-			R5	R4	R3	R2	Nth Data	
	R	H				G5	G4	G3	G2		
	R	H	-			B5	B4	B3	B2		
Register_Read											
REGREAD	W	L	-			0Dh				Register Read	
1st parameter	R	H	-			D5	D4	D3	D2	1st parameter	
:	:	:	-			:	:	:	:		
Nth parameter	R	H	-			D5	D4	D3	D2	Nth parameter	
Dot_Current											
DOTCURRENT	W	L	-			0Eh				Dot Current Set	
1st parameter	W	H	-	-	-	IR7	IR6	IR5	IR4	Red Level = 0 ~ 255uA	00h
2nd parameter	W	H	-	-	-	IR3	IR2	IR1	IR0		00h
3rd parameter	W	H	-	-	-	IG7	IG6	IG5	IG4	Green Level = 0 ~ 255uA	00h
4th parameter	W	H	-	-	-	IG3	IG2	IG1	IG0		00h
5th parameter	W	H	-	-	-	IB7	IB6	IB5	IB4	Blue Level = 0 ~ 255uA	00h
6th parameter	W	H	-	-	-	IB3	IB2	IB1	IB0		00h
Pre-Charge_Mode											
PRCSELECT	W	L	-			1Bh				Pre-Charge Mode Set	
1st parameter	W	H	-	-	-	-	-	D1	D0		01h
Pre-Charge_Pulse_Width											
PRCWIDTH	W	L	-			1Ch				Pre-Charge Width Set	
1st parameter	W	H	-	-	-	T7	T6	T5	T4	Width = 0 ~ 255us	00h
2nd parameter	W	H	-	-	-	T3	T2	T1	T0		08h

Instruction	W/R	A0	D17 - D6	D5	D4	D3	D2	D1	D0	Function	Default
Peak_Pulse_Width											
PEAKWIDTH	W	L	-	1Dh						Peak Pulse Width Set	
1st parameter	W	H	-	-	W4	W3	W2	W1	W0	Red Width = 0 ~ 31us	05h
2nd parameter	W	H	-	-	W4	W3	W2	W1	W0	Green Width = 0 ~ 31us	05h
3rd parameter	W	H	-	-	W4	W3	W2	W1	W0	Blue Width = 0 ~ 31us	05h
Peak_Pulse_Delay											
PEAKDELAY	W	L	-	1Eh						Peak Pulse Delay Set	
1st parameter	W	H	-	-	-	W3	W2	W1	W0	Delay = 0 ~ 15us	05h
Row_Overlap_Scan											
ROWSCAN	W	L	-	1Fh						Row Scan Set	
1st parameter	W	H	-	D5	D4	D3	-	D1	D0	D[5:4] : Row Overlap Timing Set D[3] : Row Scan Mode Set D[1:0] : Row Scan Sequence Set	00h
RGB_Interface_Mode											
RGBIF	W	L	-	2Dh						RGB Interface Set	
1st parameter	W	H	-	RB	RA	DM1	DM0	RM1	RM0	RGB Interface Mode set	00h
Display_Clock_Condition											
DISPCLK	W	L	-	2Eh						Display Clock condition set	
1st parameter	W	L	-	-	-	-	-	HN7	HN6	Number of pixels during 1H	02h
2nd parameter	W	L	-	HN5	HN4	HN3	HN2	HN1	HN0		08h
3rd parameter	W	H	-	-	-	BP3	BP2	BP1	BP0	Number of lines for Back Porch	0Eh
4th parameter	W	L	-	-	-	FP3	FP2	FP1	FP0	Number of lines for Front Porch	02h
RGB_Signal_Polarity											
RGBPOL	W	L	-	2Fh						RGB Interface Signal Set	
1st parameter	W	H	-	-	PV	PH	PC	PE	PO	RGB Interface Polarity	00h
Row Power Selection Set											
VROWSEL	W	L	-	3Ah						Row Power Level Set	
1st parameter	W	H	-	-	EN	S3	S2	S1	S0		04h

9.2 Screen Saver command

SS: Screen Saver, "-": Don't care

Instruction	W/R	A0	D17 - D6	D5	D4	D3	D2	D1	D0	Function	Default
Screen_Saver_Sleep_Timer											
SSLPTIM	W	L	-	10h						SS Sleep Timer Set	-
1st parameter	W	H	-	-	-	T7	T6	T5	T4	Timer = 0 ~ 255s	00h
2nd parameter	W	H	-	-	-	T3	T2	T1	T0		00h
Screen_Saver_Sleep_Start											
SSLPSTRT	W	L	-	11h						SS Auto Sleep Timer Start	-
1st parameter	W	H	-	-	-	-	-	-	D0		00h
Screen_Saver_Step_Timer											
SSTEPTIMER	W	L	-	12h						SS Step Timer Set	-
1st parameter	W	H	-	-	-	T7	T6	T5	T4	Timer = 0 ~ 25.5s	00h
2nd parameter	W	H	-	-	-	T3	T2	T1	T0		
Screen_Saver_Step_Unit											
SSTEPUNIT	W	L	-	13h						SS Step Timer Unit Set	-
1st parameter	W	H	-	-	-	-	-	S1	S0		00h
Screen_Saver_Box_Area											
SBOXSIZE	W	L	-	14h						SS Box Column & Row Set	-
1st parameter	W	H	-	-	-	-	SX6	SX5	SX4	SS Box Column Start Address	00h
2nd parameter	W	H	-	-	-	SX3	SX2	SX1	SX0		00h
3rd parameter	W	H	-	-	-	-	EX6	EX5	EX4	SS Box Column End Address	07h
4th parameter	W	H	-	-	-	EX3	EX2	EX1	EX0		0Fh
5th parameter	W	H	-	-	-	-	SY6	SY5	SY4	SS Box Row Start Address	00h
6th parameter	W	H	-	-	-	SY3	SY2	SY1	SY0		00h
7th parameter	W	H	-	-	-	-	EY6	EY5	EY4	SS Box Row End Address	07h
8th parameter	W	H	-	-	-	EY3	EY2	EY1	EY0		0Fh
Screen_Saver_Changing_Moving_Step											
SSTEPSET	W	L	-	15h						SS Changing or Moving Step Set	-
1st parameter	W	H	-	-	-	SX3	SX2	SX1	SX0	X Step	01h
2nd parameter	W	H	-	-	-	SY3	SY2	SY1	SY0	Y Step	01h
Screen_Saver_Condition											
SCONDI	W	L	-	16h						SS Condition Set	-
1st parameter	W	H	-	-	LO	U	D	R	L		00h
Screen_Saver_Start/Stop											
SSTTSTP	W	L	-	17h						SS Start/Stop	-
1st parameter	W	H	-	-	-	-	-	-	SS		00h
Screen_Saver_Select											
SSELECT	W	L	-	18h						SS Select Common Command	-
1st parameter	W	H	-	-	-	SS3	SS2	SS1	SS0	SS 0=ZIGZAG SS 1=RANDOM SS 2=MultiScroll SS 3=FadeInOut SS 4=FadeBox SS 5=FadeMask SS 6=FadeScroll SS 7=AutoColor	00h

Instruction	W/R	A0	D17 - D6	D5	D4	D3	D2	D1	D0	Function	Default
Screen_Saver_Color_Stage											
SCOLSTG	W	L	-	19h						SS Color Stage Set	-
1st parameter	W	H	-	-	-	-	S2	S1	S0		00h
Screen_Saver_Color_Pallet											
SCOLPAL	W	L	-	1Ah						SS Pallet Set	-
1st parameter	W	H	-	-	RV	-	R	G	B	RGB pallet data for pallet0	07h
2nd parameter	W	H	-	-	RV	-	R	G	B	RGB pallet data for pallet1	06h
3rd parameter	W	H	-	-	RV	-	R	G	B	RGB pallet data for pallet2	05h
4th parameter	W	H	-	-	RV	-	R	G	B	RGB pallet data for pallet3	04h
5th parameter	W	H	-	-	RV	-	R	G	B	RGB pallet data for pallet4	03h
6th parameter	W	H	-	-	RV	-	R	G	B	RGB pallet data for pallet5	02h
7th parameter	W	H	-	-	RV	-	R	G	B	RGB pallet data for pallet6	01h
8th parameter	W	H	-	-	RV	-	R	G	B	RGB pallet data for pallet7	00h

Table 5: Control and Display Command Table

10. REFERENCE APPLICATION CIRCUIT

This is an example for the application circuit for using LT1615 DC/DC converter. Users can choose their own DC/DC voltage converter.

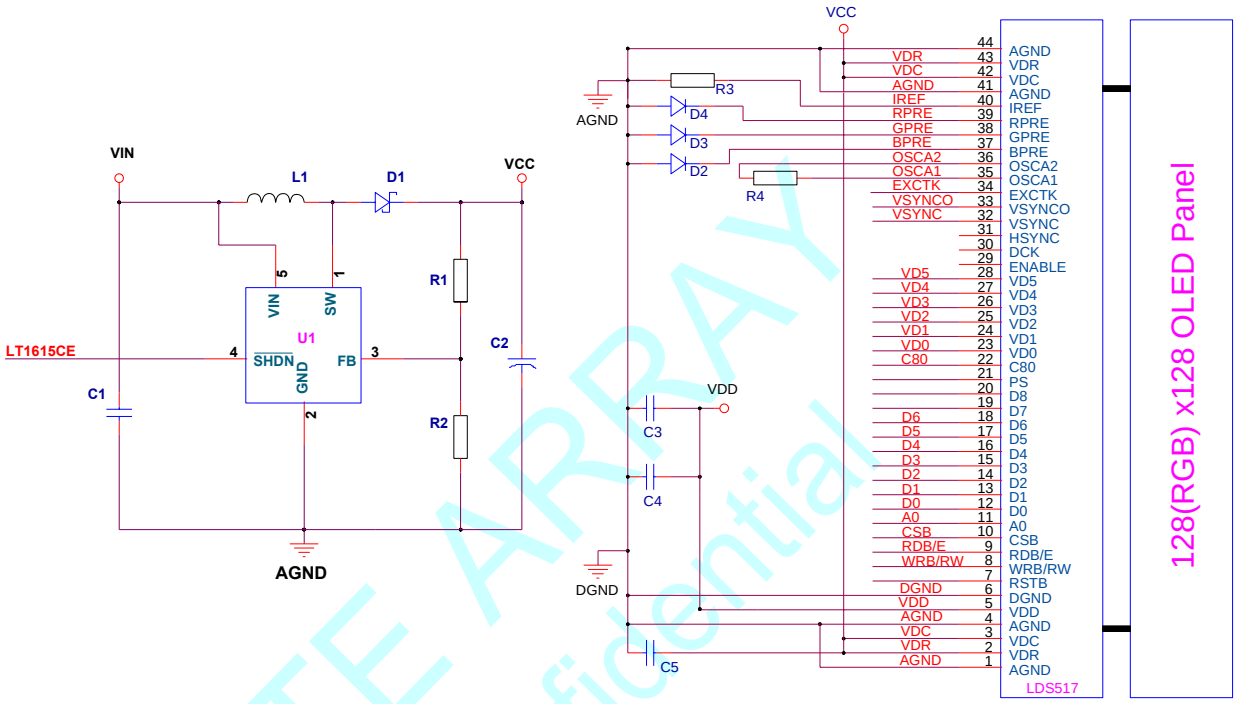


Figure 5: Reference Application Circuit

Notes:

- MPU interface: 6-bit, 8-bit, 9-bit, 16-bit or 18-bit 6800-series/8080-series parallel interface and Serial interface. It is pin selectable by PS and C80.

	6800-series parallel interface	8080-series parallel interface	Serial interface
PS	1	1	0
C80	1	0	0

- U1: LT1615 DC/DC Converter
- LT1615CE can be connected to MCU or VDD for alternative solution.
- VCC = 1.23 x (R1 + R2)/R2

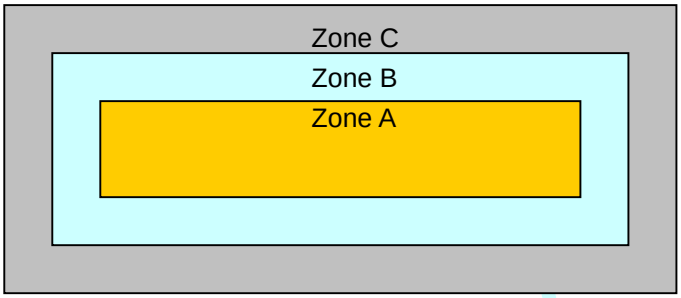
Below table is the component list for the application circuit.

Item	Description
LDS517	OLED Driver IC (*Leadis*)
U1	DC/DC Converter – LT1615 Step-up (*Linear*)
L1	Inductor
D1	Schottky Diode
D2, D3, D4	Zener Diode
R1	Resistor
R2	Resistor
R3	Resistor
R4	Resistor
C5	Capacitor
C1, C2, C3, C4	Capacitor

Table 6: Component list for the reference application circuit

11. QUALITY SPECIFICATIONS

11.1 Quality guaranty of Zone

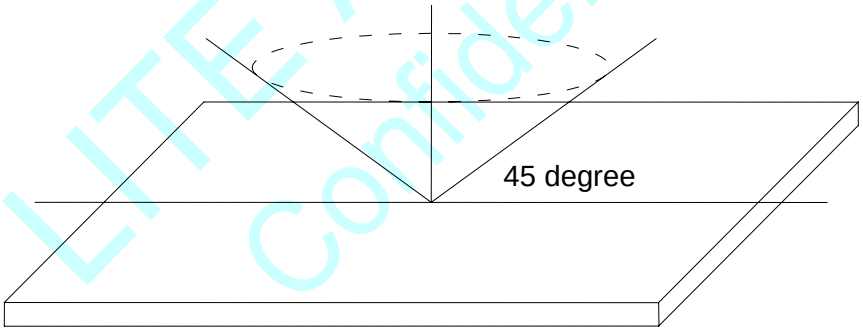


Zone A: Active Area
Zone B: Viewing Area
Zone C: Appearance or other module organization of Zone B

11.2 Inspection Condition

Temperature: 20~30℃
Humidity: 40~70%RH
Pressure: 86~106kPa

Functional and Appearance tests shall be performed when the module is turned ON and OFF respectively, allowing a distance of 30cm or more. The viewing angle for a visual check shall not exceed 45 degrees from the vertical in each direction: forward, backward, right and left (See the sketch below). A sample shall be subject to visual observations under the fluorescent lamp of 40watts.



11.3 AQL

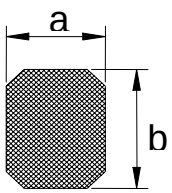
Defect type	Sampling procedures	AQL
Major	MIL-STD-105D Inspection level Ⅰ normal inspection single sample inspection	0.65
Minor	MIL-STD-105D Inspection level Ⅰ normal inspection single sample inspection	1.5

***Major defect**
A major defect refers to the defect, which is considered to substantial degradation to the usability for product application.

***Minor defect**
A minor defect refers to the defect, which is not considered to be substantial degradation for product application, or the defect, which deviate from the existing standards, and it is almost unrelated to the effective use of the product or its operation.

11.4 Inspection standards

The size of foreign object or black spot shall be defined as follows



D (mm) = (a + b) / 2 [When changing square, length of a side]

1) Major

Zone	Item	Judgment
A. B (turn on)	Non display	No non display is allowed
	Irregular operating	No irregular operation is allowed
	Short	No shorts are allowed
	Open	Any segments or common patterns that don't active are rejected.

2) Minor

2-1) Alien substance, Blemish

Zone	D size (mm)	Judgment
A.B (turn on)	D ≤ 0.10	Pass
	0.10 < D ≤ 0.15	2
	0.15 < D ≤ 0.20	1
	0.20 < D	0

2-2) Scratch on Polarizer

Zone	Width (W, mm)	Length (L, mm)	Judgment
A.B (turn on)	W≤0.03	Pass	Pass
	0.03<W≤0.05	L≤2.0	Pass
		L>2.0	1
	0.05<W≤0.08	L>1.0	1
		L≤1.0	Pass
	0.08<W	(*)	(*)

2-3) Polarizer Bubble

Zone	D size (diameter, mm)	Judgment
A.B (turn on)	D ≤ 0.20	PASS
	0.20 < D ≤ 0.50	3
	0.50 < D ≤ 0.80	2
	0.80 < D	FAIL

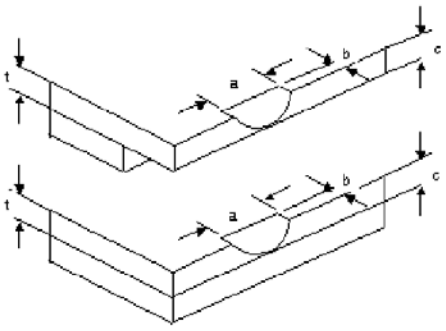
2-4) White/Dark Spot (Spot/Line type)

Zone	D size (mm)	Judgment
A.B (turn on)	D ≤ 0.15	PASS
	0.15 < D ≤ 0.20	3
	0.20 < D ≤ 0.30	2
	0.30 < D	FAIL

Zone	Width (W, mm)	Length (L, mm)	Judgment
A.B (turn on)	0.03<W ≤ 0.04	10<L	5
	0.04<W ≤ 0.06	5.0<L ≤ 10	3
	0.06<W ≤ 0.07	1.0<L ≤ 5.0	2
	0.07<W ≤ 0.09	L ≤ 1.0	1

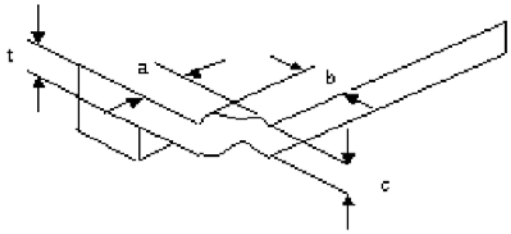
3) CRACKS

①General crack(unit : mm)

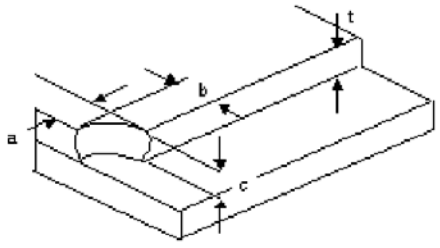


a ≤ 1/6 panel length
b ≤ 1
c ≤ t

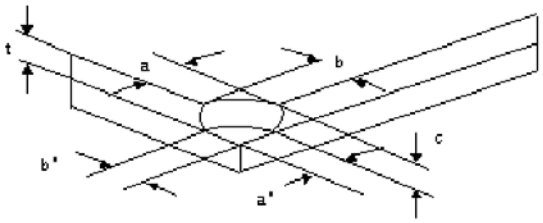
②Corner crack(unit :mm)



a ≤ 2.5	NO EXPOSURE ANY CONDUCTIVE MATERAL
b ≤ 2.5	
c ≤ t	

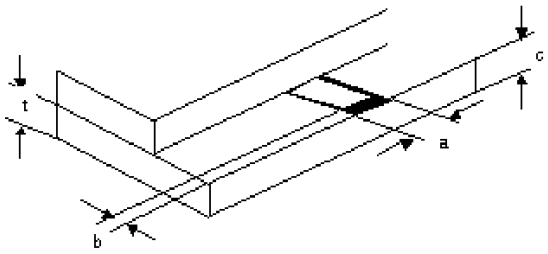


a ≤ 0.7	NO EXPOSURE ANY CONDUCTIVE MATERAL
b ≤ 0.7	
c ≤ t	



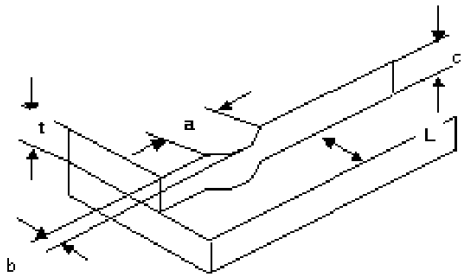
a ≤ 1.3	a ' ≤ a
b ≤ 1.3	b ' ≤ b
c ≤ t	

③Electrode pad crack (unit : mm)



a ≤ 1/6 panel length
b ≤ 1/6 pad length
c ≤ t

④Glass chip remain (unit : mm)



a ≤ 1/6 panel length
b ≤ 1/10 pad length
c ≤ t

⑤Future crack (unit: mm)

NO TOLERATION ANY PROGRESSING CRACK

11.5 Reliability test condition

Operating life time (30% ON, 50cd/ m_2): Longer than 10,000 hours
Reliability characteristics shall meet following requirements

No.	ITEM	CONDITION	TEST TIME	CRITERION
1	High Humidity Storage	60±2℃,95±5%RH	96 Hrs	Brightness: over 50% of initial value. Color coordination: within ±0.05 of initial value.
2	High Humidity Operation	60±2℃,95±5%RH	96 Hrs	
3	High Temperature Storage	80±2℃	96 Hrs	
4	High Temperature Operation	60±2℃	96 Hrs	
5	Low Temperature Storage	-30±2℃	96 Hrs	
6	Low Temperature Operation	-20±2℃	96Hrs	
7	Thermal shock	-30℃(30min) →80℃(30min) 5Cycles, Transient time = 10 min (Turn off) -30℃(30min) → 80℃(30min) 5 Cycles Transient time = 10 min (Turn on)		Appearance or E/T inspection: follows working specification.
8	Vibration test (Packaging state)	1.Operating time: 2hrs exposure in each direction (X, Y, Z) 2. Frequency (1min): 10 to 55Hz 3. Amplitude: 2mm		There isn't crack and broken on soldering part.
9	Drop test (Packaging state)	1. Direction: 1 corner, 3 edges, 6 faces, drop once for each direction 2. 3 times height 1.8m or 5 times height 1.5m from concrete surface		There isn't crack and broken on soldering part.
10	ESD	150Pf, 330Ω, ±8kV 10times, air discharge		After testing, cosmetic and electrical defects should not happen. Total current consumption should be double of initial value.