APEX DISPLAY CO.,LTD.
晶英光電科技股份有限公司

NO: 060036

LCD-Module
SPECIFICATION

Approved by Customer		

AGSC162CCLYH23

APPROVED BY	CHECKED BY	ORGANIZED BY
Natty	Sam,Ivan	Ilsa

RECORD OF REVISION

Revision Date	Page	Contents
2006/06/27	-	New Release

1 FEATURES

(1) Display format : 16 characters × 2 lines

(2) Construction : STN yellow-green LCD panel, Black Bezel, Zebra and PCB.

(3) Optional: Array LED back-light.

(4) Controller : KS0066U or Equivalent.

(5) 5V single power input. (Special request for 3.3V driving, built-in DC/DC converter.)

(6) Extended temperature type.

(7) Excellent LC : VOP maintains at 5V for whole temp. range, no need extra temp. compensation circuit.

2 NUMBERING SYSTEM

AG_ _ -162C _ _ _ _ - _
1 2 3 4 5 6 7

No	Code Value	Description	Remark
1	T	TN	LCD type
	H	HTN	
	S	STN yellow-green	
	G	STN Gray	
	B	STN Blue(Negative)	
	F	FSTN	
	C	STN-color	
	A	A-TFT	
	L	Ltps-TFT	
	O	OLED	
	P	PLED	
2	C	Character-COB	Display type
	D	Character-TAB	
	E	Character-COG	
	F	Character-COF	
	G	Graphic-COB	
	H	Graphic-TAB	
	K	Graphic-COG	
	L	Graphic-COF	
3	A	Reflective type / 6:00 view	Polarizer / Viewing Angle
	B	Reflective type / 12:00 view	

	C	Transflective type / 6:00 view	
	D	Transflective type / 12:00 view	
	E	Transmissive type / 6:00 view	
	F	Transmissive type / 12:00 view	
	G	Negative type / 6:00 view	
	H	Negative type / 12:00 view	
	I	Negative type / 3:00 view	
	J	Transmissive type / 3:00 view	
	K	Transflective type / 3:00 view	
	O	Others	
4	N	None backlight	Backlight type
	L	LED array	
	Q	LED edge	
	E	EL	
	C	CCFL	
5	None	Without backlight	Backlight color
	A	Amber	
	B	Blue	
	G	Green	
	L	Yellow	
	O	Orange	
	R	Red	
	Y	Yellow-green	
	W	White	
	F	OLED&PLED-Full Color	
	M	OLED&PLED-Area or Normal Color	
6	N	Normal temperature type	LCM temperature type
	H	Extended temperature type	
7	00~99		Version code

3 MECHANICAL DATA

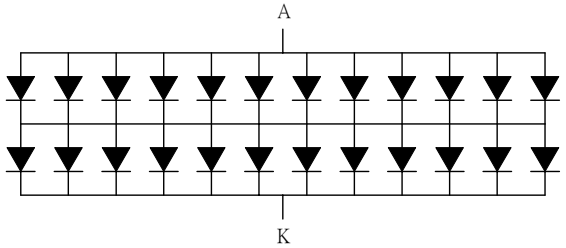
Parameter	Stand Value	Unit
Dot size	0.55 (W) × 0.65 (H)	mm
Dot pitch	0.60 (W) × 0.70 (H)	mm
Character size	2.95(W) × 5.55(H)	mm
Viewing area	64.0(W) × 17.2(H)	mm
Module size	80.0 (W) ×36.0(H) × 10.0 max (T)	mm
Module size (Array LED back-light)	80.0(W) × 36.0(H) × 14.5 max (T)	mm

4 ABSOLUTE MAXIMUM RATINGS

Parameter		Symbol	Min	Max	Unit
Logic Circuit Supply Voltage		VDD-VSS	-0.3	7.0	V
LCD Driving Voltage		VDD-VO	-0.3	10.0	V
Input Voltage		VI	-0.3	VDD+0.3	V
Normal temp. type	Operating Temp.	TOP	0	50	°C
	Storage Temp.	TSTG	-20	70	°C
Extended temp. type	Operating Temp.	TOP	-20	70	°C
	Storage Temp.	TSTG	-30	80	°C

5 ELECTRO-OPTICAL CHARACTERISTICS

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
----- Electronic Characteristics -----							
Logic Circuit Supply Voltage	VDD-VSS	--	2.7	--	5.5	V	
LCD Driving Voltage (STN)	VDD-VO	0 °C	--	4.6	4.9	V	-20 ~ 70 °C for Extended Temp. type
		25 °C	--	4.5	4.8		
		50 °C	--	4.3	4.6		
Input Voltage	VIH	--	0.7 VDD	--	VDD	V	
	VIL	--	VSS	--	0.3 VDD	V	
Logic Supply Current	IDD	VDD = 5V	--	1.0	1.5	mA	
----- Optical Characteristics (STN) -----							
Contrast	CR	25°C	2	8	--		Note 1
Rise Time	tr	25°C	--	80	120	ms	Note 2
Fall Time	tf	25°C	--	150	300	ms	
Viewing Angle Range	θ f	25°C & CR≥2	--	40	--	Deg.	Note 3
	θ b		--	35	--		
	θ l		--	35	--		
	θ r		--	35	--		
Frame Frequency	fF	25°C	--	64	--	Hz	
-----Array type LED Back-light Characteristics -----							
Parameter	**Symbol**	**Condition**	**Min**	**Typ**	**Max**	**Unit**	**Note**
Forward Voltage	VF	--	--	4.05	4.3	V	Supply Voltage between A&K
Forward Current	IF	VF=4.05V	--	120	--	mA	
Bare LED Luminous intensity		VF=4.05V	--	100	--	cd/m^2	
LCM Luminous intensity		VF=4.05V	--	30	--	cd/m^2	

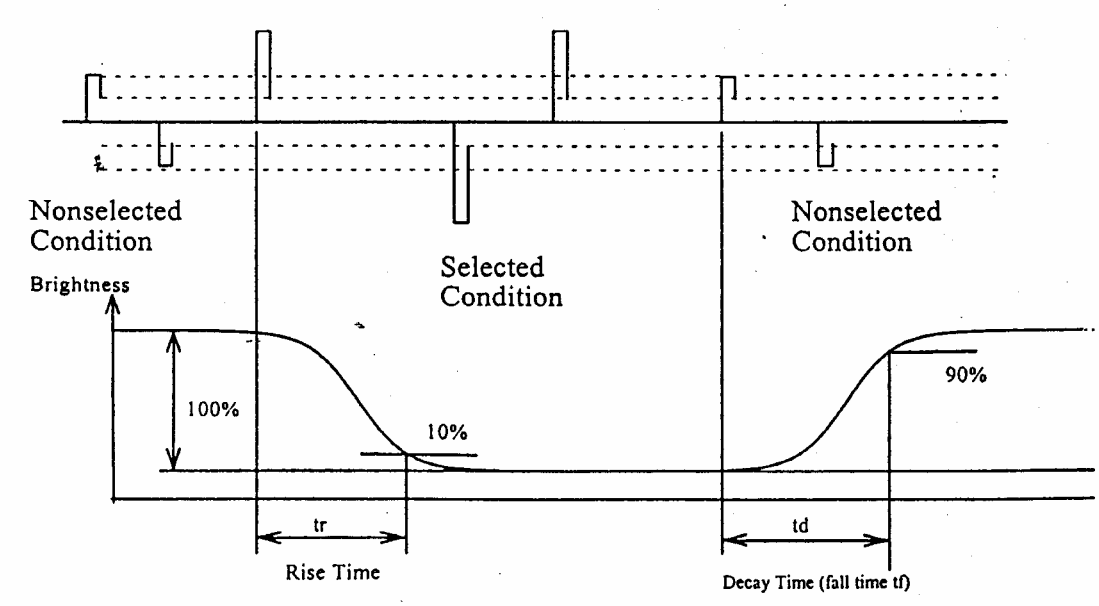


* LED Dice number = 2×12=24

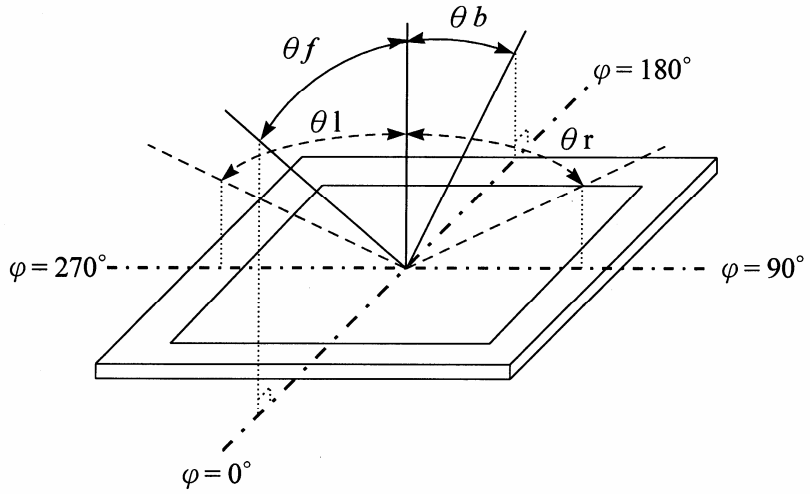
(NOTE 1) Contrast ratio :

CR = (Brightness in OFF state) / (Brightness in ON state)

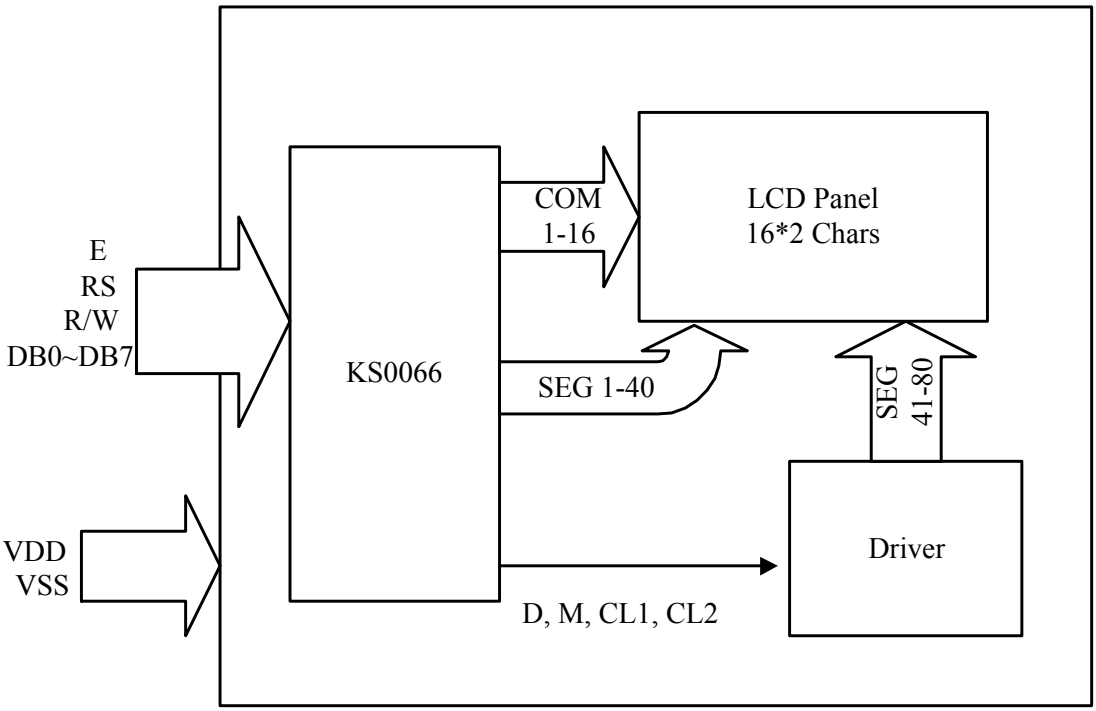
(NOTE 2) Response time :



(NOTE 3) Viewing angle

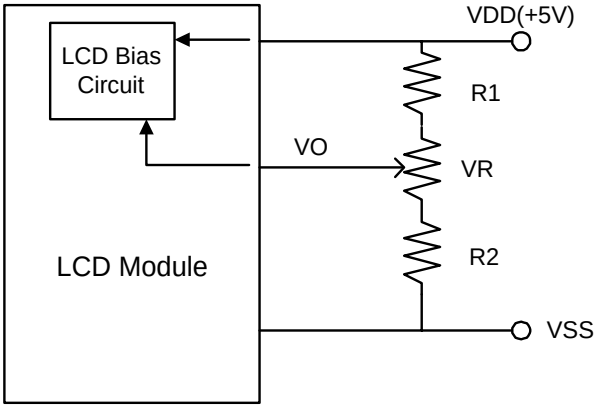


6 BLOCK DIAGRAM & INTERFACE

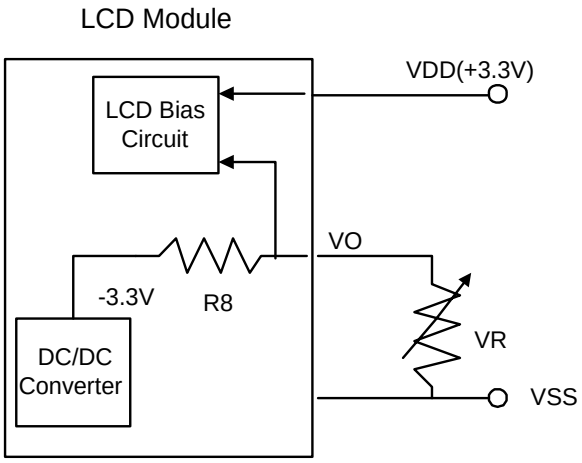


No.	Symbol	Function
1	VSS	Ground (0V)
2	VDD	Supply Voltage for Logic (+5V or +3.3V)
3	VO	Contrast Adjustment
4	RS	Data/Instruction Select
5	R/W	Read/Write Select
6	E	Enable Signal
7	DB0	Data Bus
8	DB1	Data Bus
9	DB2	Data Bus
10	DB3	Data Bus
11	DB4	Data Bus
12	DB5	Data Bus
13	DB6	Data Bus
14	DB7	Data Bus
15	LED_A	LED Power Supply + (5V)
16	LED_K	LED Power Supply - (5V)

7 POWER SUPPLY



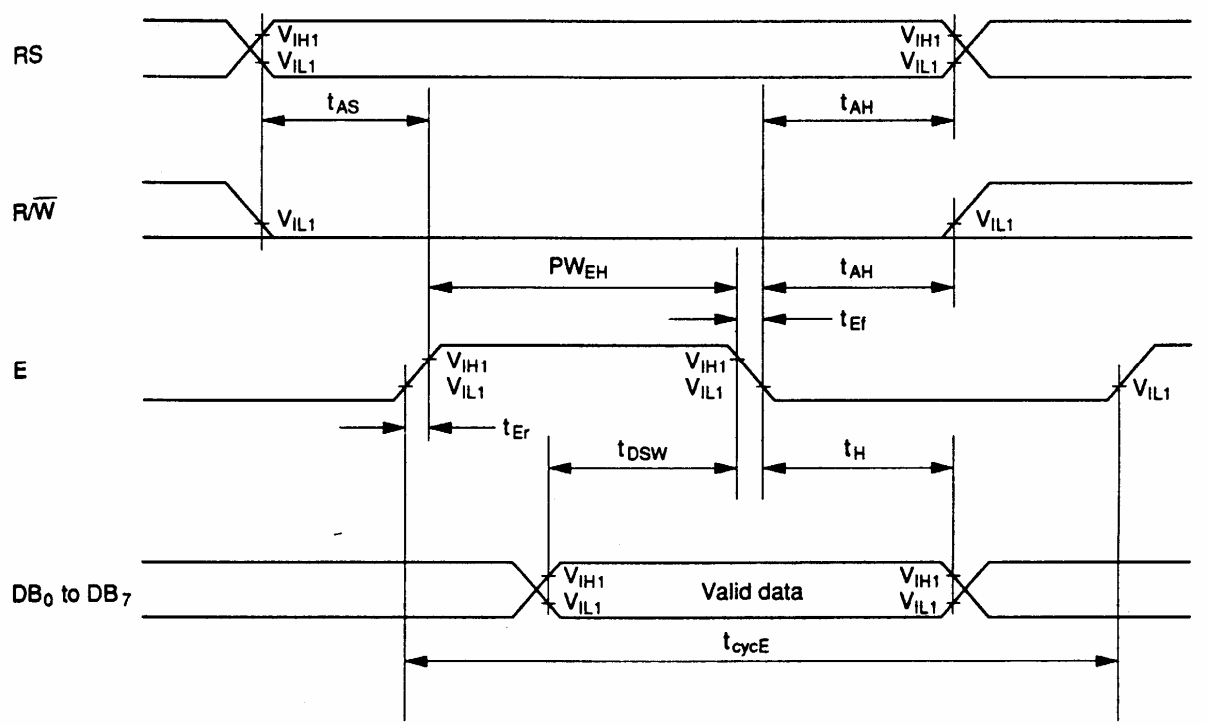
5V Power Input



3.3V Power Input

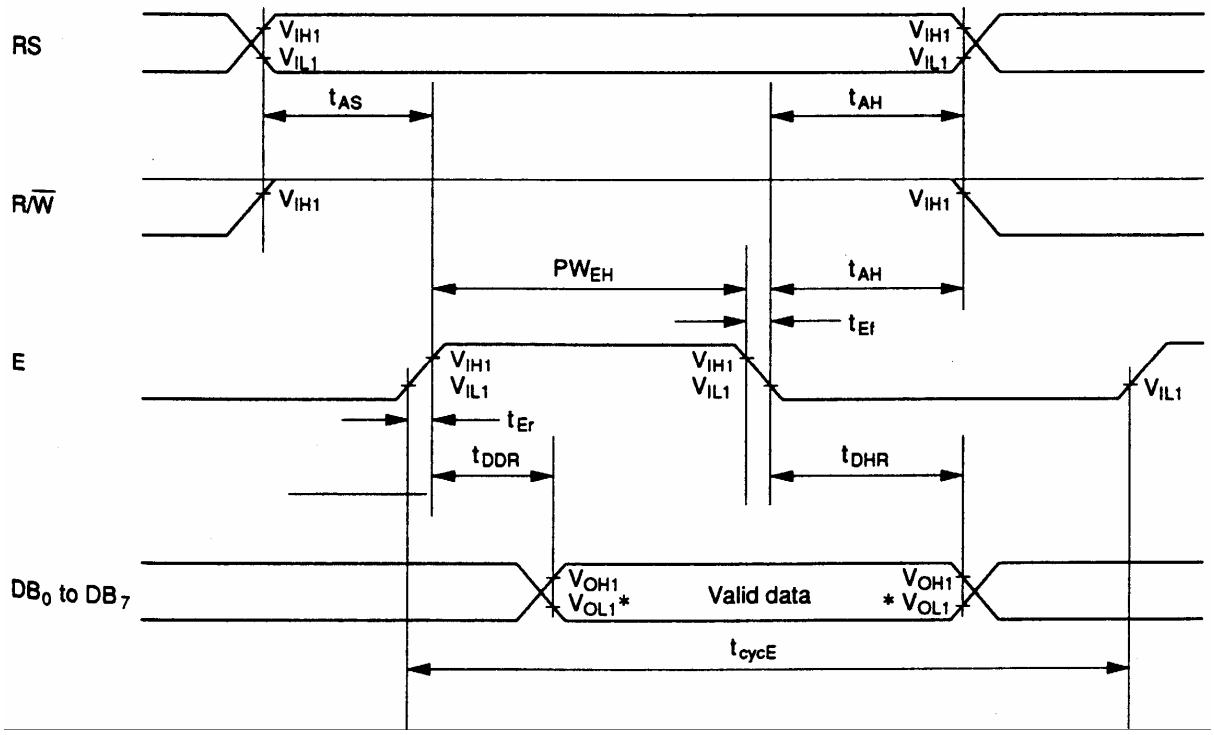
8 TIMING CHARACTERISTICS

Write Operation



Item	Symbol	VDD=5V		VDD=3.3V		Unit
		Min	Max	Min	Max	
Enable cycle time	tcycE	500	--	1000	--	ns
Enable pulse width	PWEH	230	--	450	--	
Enable rise/fall time	tEr,tEf	--	20	--	25	
Address set-up time (RS, R/W to E)	tAS	40	--	60	--	
Address hold time	tAH	10	--	20	--	
Data set-up time	tDSW	80	--	195	--	
Data hold time	tH	10	--	10	--	

Read Operation



Item	Symbol	VDD=5V		VDD=3.3V		Unit
		Min	Max	Min	Max	
Enable cycle time	tcycE	500	--	1000	--	ns
Enable pulse width	PWEH	230	--	450	--	
Enable rise/fall time	tEr,tEf	--	20	--	25	
Address set-up time (RS, R/W to E)	tAS	40	--	60	--	
Address hold time	tAH	10	--	20	--	
Data delay time	tDDR	--	120	--	360	
Data hold time	tDRH	5	--	5	--	

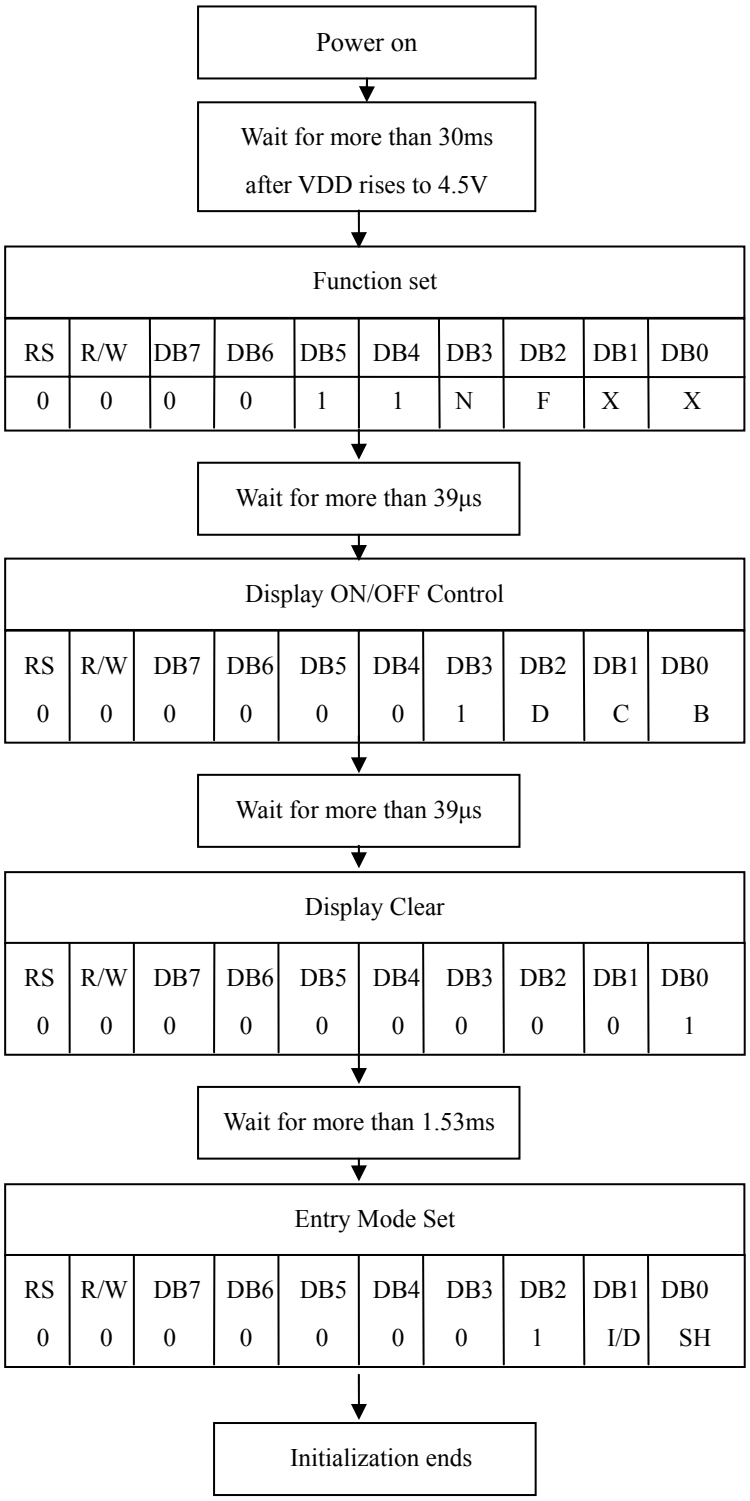
9 INSTRUCTION SET

Instruction	Code										Description	E.T.(fosc =270 KHZ)
	RS	R/W	D7	D6	D5	D4	D3	D2	D1	D0		
Clear Display	0	0	0	0	0	0	0	0	0	1	Write"20H" to DDRAM and set DDRAM address to "00H" from AC	1.53 ms
Return Home	0	0	0	0	0	0	0	0	1	--	Sets DD RAM address to "00H" from AC and return cursor to its original position if shifted. The contents of DDRAM are not changed.	1.53 ms
Entry Mode SET	0	0	0	0	0	0	0	1	I/D	SH	Assign cursor moving direction and enable the shift of entire display.	39 μS
Display ON/OFF Control	0	0	0	0	0	0	1	D	C	B	Set display (D), cursor (C), and blink of cursor (B) on/off control bit.	39 μS
Cursor or Display Shift	0	0	0	0	0	1	S/C	R/L	--	--	Set cursor moving and display shift control bit, and the direction, without changing of DDRAM data.	39 μS
Function Set	0	0	0	0	1	DL	N	F	--	--	Sets interface data length (DL:8-bit/4-bit), number of display lines (N:2-line/1-line) and , display font type (F:5x11dots/5x8 dost).	39 μS
Set CG RAM Address	0	0	0	1	AC5	AC4	AC3	AC2	AC1	AC0	Sets CG RAM address in address counter.	39 μS
Set DD RAM Address	0	0	1	AC6	AC5	AC4	AC3	AC2	AC1	AC0	Sets DD RAM address in address counter.	39 μS
Read Busy Flag and Address	0	1	BF	AC6	AC5	AC4	AC3	AC2	AC1	AC0	Whether during internal operation or not can be known by reading BF. The contents of address counter can also be read.	0 μS
Write Data to RAM	1	0	D7	D6	D5	D4	D3	D2	D1	D0	Writes data into internal RAM (DD RAM /CG RAM).	43 μS
Read Data from RAM	1	1	D7	D6	D5	D4	D3	D2	D1	D0	Reads data from internal RAM (DD RAM /CG RAM).	43 μS

* "--" : don't care

Note : When an MPU program with checking the Busy Flag(DB7) is made, it must be necesssary1/2Fosc is necessary for executing the next instruction by the falling edge of the 'E' signal after the Busy Flag(DB7) goes to "LOW".

10 INITIALIZATION SEQUENCE



N	0	1-line mode
	1	2-line mode

F	0	Font Size 5X7
	1	Font Size 5X10

D	0	display off
	1	display on

C	0	cursor off
	1	cursor on

B	0	blink off
	1	blink on

I/D	0	decrement mode
	1	increment mode

SH	0	entire shift off
	1	entire shift on

11 DD RAM ADDRESS

DIGIT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 LINE	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
2 LINE	40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F

12 FONT TABLE

Upper 4bit / Lower 4bit	LLLL	LLLH	LLHL	LLHH	LHLL	LHLH	LHHL	LHHH	HLLL	HLLH	HLHL	HLHH	HHLL	HHLH	HHHL	HHHH
LLLL	CG RAM (1)															
LLLH	(2)															
LLHL	(3)															
LLHH	(4)															
LHLL	(5)															
LHLH	(6)															
LHHL	(7)															
LHHH	(8)															
HLLL	(1)															
HLLH	(2)															
HLHL	(3)															
HLHH	(4)															
HHLL	(5)															
HHLH	(6)															
HHHL	(7)															
HHHH	(8)															

13 QUALITY AND RELIABILITY

13.1 TEST CONDITIONS

Tests should be conducted under the following conditions :

Ambient temperature : 25 ± 5°C

Humidity : 60 ± 25% RH.

13.2 SAMPLING PLAN

Sampling method shall be in accordance with MIL-STD-105E , level II, normal single sampling plan .

13.3 ACCEPTABLE QUALITY LEVEL

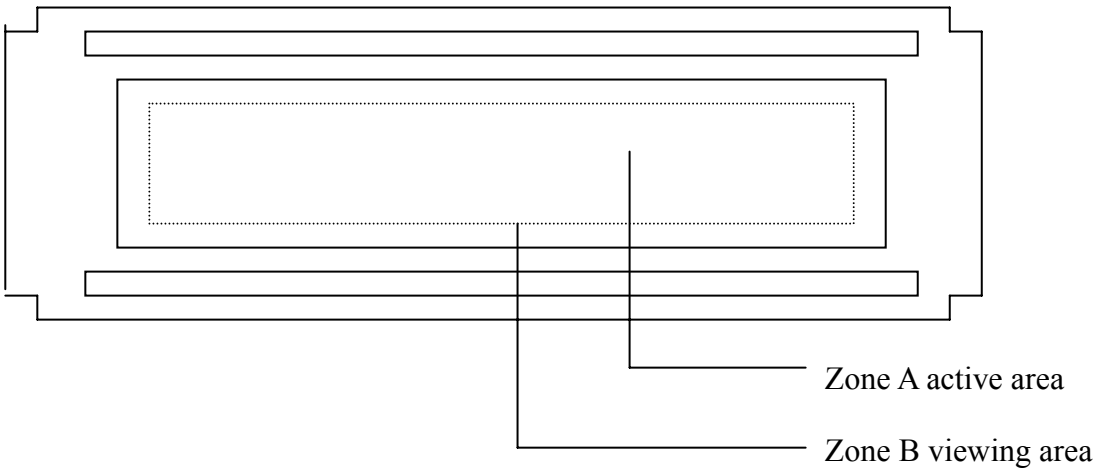
A major defect is defined as one that could cause failure to or materially reduce the usability of the unit for its intended purpose. A minor defect is one that does not materially reduce the usability of the unit for its intended purpose or is an infringement from established standards and has no significant bearing on its effective use or operation.

13.4 APPEARANCE

An appearance test should be conducted by human sight at approximately 30 cm distance from the LCD module under flourescent light. The inspection area of LCD panel shall be within the range of following limits.

13.5 INSPECTION QUALITY CRITERIA

Item	Description of defects			Class of Defects	Acceptable level (%)
Function	Short circuit or Pattern cut			Major	0.65
Dimension	Deviation from drawings			Major	1.5
Black spots	Ave . dia . D	area A	area B	Minor	2.5
	D≤0.2	Disregard			
	0.2<D≤0.3	3	4		
	0.3<D≤0.4	2	3		
	0.4<D	0	1		
Black lines	Width W, Length L	A	B	Minor	2.5
	W≤0.03	disregard			
	0.03<W≤0.05	3	4		
	0.05<W≤0.07 , L≤3.0	1	1		
	See line criteria				
Bubbles in polarizer	Average diameter D 0.2 < D < 0.5 mm for N = 4 , D > 0.5 for N = 1			Minor	2.5
Color uniformity	Rainbow color or newton ring.			Minor	2.5
Glass Scratches	Obvious visible damage.			Minor	2.5
Contrast ratio	See note 1			Minor	2.5
Response time	See note 2			Minor	2.5
Viewing angle	See note 3			Minor	2.5



13.6 RELIABILITY

Test Item	Test Conditions		Note
	Normal Temp. type	Extended Temp. type	
High Temperature Operation	50±3°C , t=96 hrs	70±3°C , t=96 hrs	
Low Temperature Operation	0±3°C , t=96 hrs	-20±3°C , t=96 hrs	
High Temperature Storage	70±3°C , t=96 hrs	80±3°C , t=96 hrs	1,2
Low Temperature Storage	-20±3°C , t=96 hrs	-30±3°C , t=96 hrs	1,2
Temperature Cycle	-20°C ~ 25°C ~ 70°C 30 m in. 5 min. 30 min. (1 cycle) Total 5 cycle	-30°C ~ 25°C ~ 80°C 30 min. 5 min. 30 min. (1 cycle) Total 5 cycle	1,2
Humidity Test	40 °C, Humidity 90%, 96 hrs		1,2
Vibration Test (Packing)	Sweep frequency : 10 ~ 55 ~ 10 Hz/1min Amplitude : 0.75mm Test direction : X.Y.Z/3 axis Duration : 30min/each axis		2

Note 1 : Condensation of water is not permitted on the module.

Note 2 : The module should be inspected after 1 hour storage in normal conditions (15-35°C , 45-65%RH).

Definitions of life end point :

- Current drain should be smaller than the specific value.
- Function of the module should be maintained.
- Appearance and display quality should not have degraded noticeably.
- Contrast ratio should be greater than 50% of the initial value.

14 HANDLING PRECAUTIONS

(1) A LCD module is a fragile item and should not be subjected to strong mechanical shocks.

(2) Avoid applying pressure to the module surface. This will distort the glass and cause a change in color.

(3) Under no circumstances should the position of the bezel tabs or their shape be modified.

(4) Do not modify the display PCB in either shape or positioning of components.

(5) Do not modify or move location of the zebra or heat seal connectors.

(6) The device should only be soldered to during interfacing. Modification to other areas of the board should not be carried out.

(7) In the event of LCD breakage and resultant leakage of fluid do not inhale, ingest or make contact with the skin. If contact is made rinse immediately.

(8) When cleaning the module use a soft damp cloth with a mild solvent, such as Isopropyl or Ethyl alcohol. The use of water, ketone or aromatic is not permitted.

(9) Prior to initial power up input signals should not be applied.

(10) Protect the module against static electricity and observe appropriate anti-static precautions.

15 TEST REPORT

(1) Panel

晶英光電科技股份有限公司供應商RoHS限用物質保證書

供應商保證書編號:(供應商免填)　　蓋印公司章

公司名稱: 富相電子科技(東莞)有限公司
公司地址: 廣東省東莞市高步鎮富相大道168號
供應商責任人: 張衛民
責任人職位: 品保資深經理
聯絡電話: 86-769-8737888
電子郵件: 6sigma@goldentek.com

產品的料號:	產品品名: LCD
產品的規格:	

作為**晶英光電科技股份有限公司**之零件(半成品/成品/原物料/包裝材料)供應商, 本公司已經收到**晶英光電科技股份有限公司**關於 "環境管理物質限用管理程序" 之規範 SV-EN-D-0038 並能達到 "1" 級管理物質之要求.并積极推行規範中規定的 "2", "3" 級管理物質.且本公司人員已經了解該規範之技術要求.

本公司如有違反 RoHS 規範限用物質含量標準，而導致**晶英光電科技股份有限公司**所受之損害與所為之相關費用支出（包含但不限於律師費用、訴訟費用、通訊費用、和解費用及和解金）與自支出時之利息，概由本公司負責。

本公司並且同意因保證書或本保證書相關事宜有所爭議時，雙方宜有好協商，取得協議，如協議未成時，雙方同意於中華民國臺北市聲請仲裁，並以中華民國法律為依據。

禁用物質如下:

物質名稱	
重金屬	鎘及鎘的化合物(含量小於 5ppm)
	鉛及鉛的化合物(含量小於 50ppm)
	汞及汞的化合物(含量小於 5ppm)
	六价鉻化合物(含量小於 5ppm)
有機溴化合物	多溴聯苯(PBB)(含量小於 5ppm)
	多溴二苯醚(PBDE)(含量小於 5ppm)

如果材料中沒有上述物質,請在附表第一行特別注明" 沒有使用",如有使用請在什麼部件中注明

(使用在什麼部件)

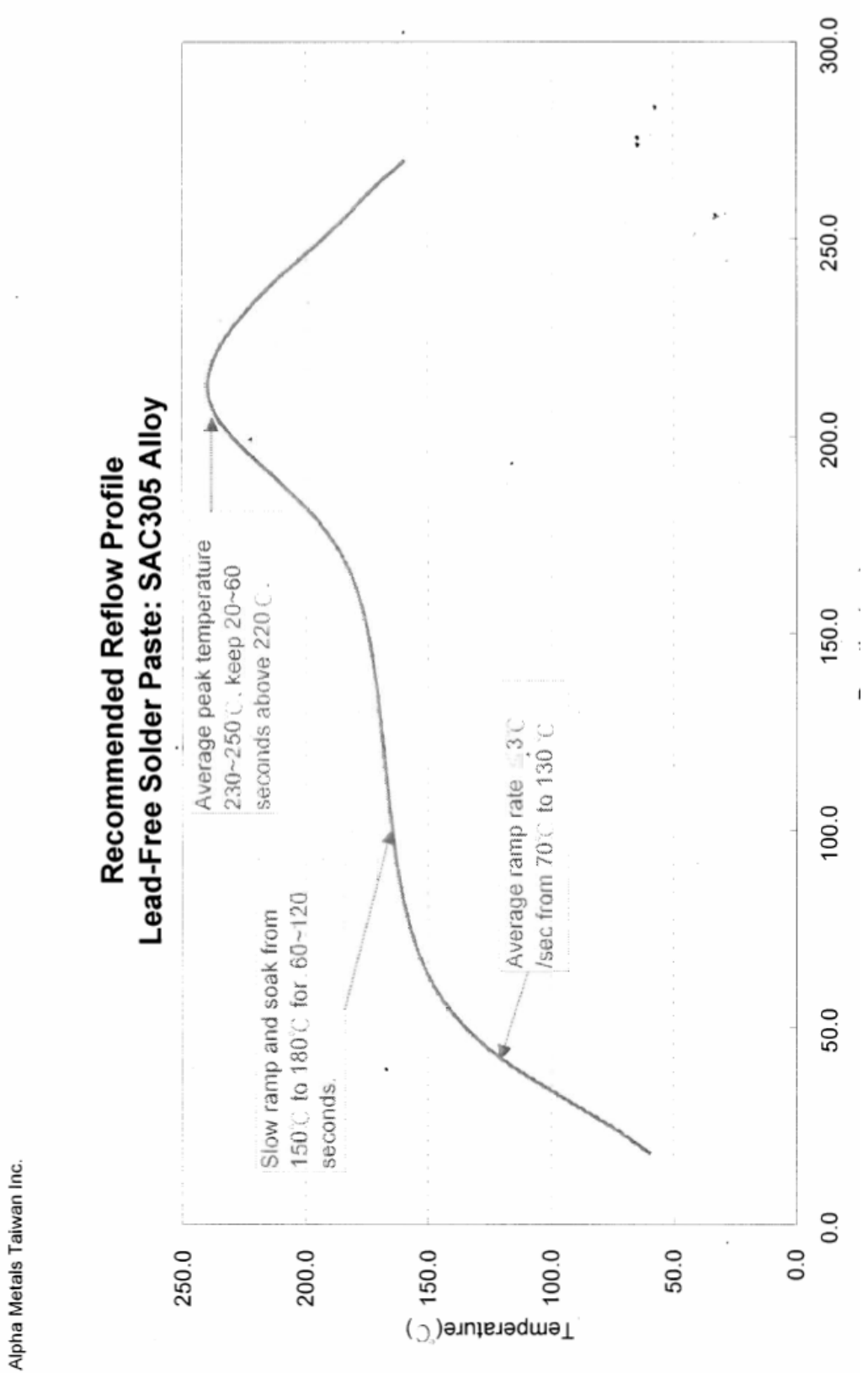
1) 沒有使用 _____

2) _____ _____

3) _____ _____

1. 本保證書不因本公司改組或簽約人離職,生產或交貨地點之改變等因素,而改變其法律效力.
2. 本公司最高管理階層及所有員工一致承諾遵循以上之保證,並落實執行之.
3. 本保證書自簽約之日期起生效,期限三年;**並承諾隨時注意 RoHS 規範之修改,當 RoHS 規範限用物質含量標準有所變更或改版時,本公司當立即依新規範配合調整產品之含量標準,本保證書仍然有效!**

(2) Tin solder


Recommended Reflow Profile
Lead-Free Solder Paste: SAC305 Alloy
Average peak temperature
230~250 C, keep 20~60
seconds above 220 C.
Slow ramp and soak from
150 C to 180 C for 60~120
seconds.
Average ramp rate ≤3 C
/sec from 70 C to 130 C
Temperature(C)
250.0
200.0
150.0
100.0
50.0
0.0
0.0
50.0
100.0
150.0
200.0
250.0
300.0
Alpha Metals Taiwan Inc.

Material Safety Data Sheet

Date: 2004, Jan. 22
Revision:

SECTION 1. GENERAL INFORMATION

- PRODUCT NAME: Solder Paste SAC305 OM325 XX-X-XX
  (Nominal metal%-Solder Particle size-Viscosity)
  These figure are changeable depending on spec.
- MANUFACTURER: Alpha Metals Japan Ltd.
- ADDRESS : 480-28 Higashitoyada, Hiratsuka-shi, Kanagawa, JAPAN
  TEL : 81-463-53-3333
  FAX : 81-463-53-3311

SECTION 2. HAZARDOUS INGREDIENTS

INGREDIENTS		CAS NUMBER	CONTENTS wt%	OSHA PEL	ACGIH TLV
Metal	Tin	7440-31-5	83-89	2.00mg/m^3	2.00mg/m^3
	Silver	7440-22-4	2-4	0.01mg/m^3	0.1mg/m^3
	Copper	7440-50-8	<1	NE	0.2mg/m^3
Chemical	Diethylene Glycol Alkyl Ether	112-73-2	15-20	NE	NE
	Tripropylene Glycol Alkyl Ether	55934-93-5	10-15	NE	NE
	Modified Rosin	144413-22-9	15-20	NE	NE
	Rosin	65997-06-0	15-20	NE	NE
	Polymer	9003-28-5	10-15	NE	NE

OSHA: Occupational Safety and Health Administration
ACGIH: American Conference of Governmental Industrial Hygienist
PEL: Permissible Exposure Limit
TLV: Threshold Limit Values

SECTION 3. PHYSICAL DATA

- BOILING POINT: NA — SPECIFIC GRAVITY(at 25°C): NA
- VAPOR PRESSURE: NA — % VOLATILE BY WEIGHT: <10
- VAPOR DENSITY(AIR=1): NA — EVAPORATION RATE(BUAC=1): NIL
- SOLUBILITY IN WATER: Negligible — pH: NA
- APPEARANCE AND ODOR: Gray, heavy viscosity paste, mild odor

[NA: Not Applicable, NE: Not Established, NL: Not Listed, UN: Unknown]

SECTION 4. FIRE AND EXPLOSION HAZARD DATA

ESTIMATED FLAMMABLE LIMITS (% By Volume in Air) LEL: NA, UEL: NA

- FLASH POINT : C.O.C >120 deg. C.
- EXTINGUISHING MEDIA : Carbon dioxide or dry chemical.
- SPECIAL FIRE FIGHTING PROCEDURES: Use NIOSH approved self-contained breathing apparatus in enclosed areas.

SECTION 5. (A) HEALTH HAZARD DATA (Symptoms/Effects of Overexposure)

- INHALATION : When heated, vapors can cause irritation to eyes, nose and throat. May cause headaches.

SKIN : Prolonged or repeated contact can cause skin rash.

EYES : Can cause irritation, tearing, blurred vision. Not a primary irritant.

CHRONIC TOXICITY: Overexposure to dust or fume under soldering work may cause irritation of the skin and mucous membranes, and may result in a benign pneumoconiosis (stannosis).

SECTION 5. (B) HEALTH HAZARD DATA (Emergency and First Aid Procedure)

INHALATION : If inhaled when heated to soldering temperatures, remove individual to fresh air. If breathing is difficult administer oxygen.

INGESTION : Call a physician or Poison Control Center immediately. Never give anything by mouth to an unconscious person.

SKIN CONTACT: Wash exposed area with soap and water. Remove contaminated clothing.

EYE CONTACT : Flush with large amounts of water, lifting upper and lower lids occasionally. Get medical attention.

SECTION 6. REACTIVE DATA

- STABILITY : Stable

CONDITIONS TO AVOID : NA

[NA: Not Applicable, NE: Not Established, NL: Not Listed, UN: Unknown]

INCOMPATIBILITY : Strong oxidizing materials, strong acids.

HAZARDOUS DECOMPOSITION PRODUCTS : Rosin acids, CO, CO_2, aliphatic aldehydes.

HAZARDOUS POLYMERIZATION : Will not occur

SECTION 7. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Material is a heavy viscous paste. Scoop into appropriate containers.
Clean with degreasing detergent or solvent such as alcohol.

WASTE DISPOSAL : Reclaim (Recycle) solder alloy portion of paste or store in sealed containers for later disposal.

Must be in accordance with Federal, State and Local Laws and Regulations.

SECTION 8. SPECIAL PROTECTION

RESPIRATORY: If threshold limit value is exceeded during the soldering operation, use NIOSH approved respirator for metal fume.

EYEWARE : Safety goggles in compliance with OSHA regulations are advised. Provide eye bath near work site.

CLOTHING/ GLOVES : Wear resistant gloves such as rubber, neoprene or plastic.

VENTILATION: Provide sufficient mechanical (general and/or local exhaust) ventilation to maintain exposure below TLVs.

SECTION 9. SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Read all container labeling. Food and drink should not be consumed or tobacco products used, nor cosmetics applied in areas where solder paste may be used.
Always wash hands after handling solder paste and before eating, drinking or smoking.

OTHER PRECAUTIONS

Containers: Since empty containers may retain product residues (Vapor, liquid or solid) all labeled hazard precautions must be observed.
Molten solder alloys consisting of tin do not produce significant quantities of fume below 480 degrees C.

[NA: Not Applicable, NE: Not Established, NL: Not Listed, UN: Unknown]

FOR INDUSTRIAL USE ONLY.
KEEP OUT OF REACH OF CHILDREN. DO NOT TAKE INTERNALLY.

HANDLING AND STORAGE	:	Flammable. Keep away from all source of spark, heat and flame. Store the product not in use in a cold and dark place.

OTHERS : * Wash your hands after handling

* Similar cautions should be necessary for vacant cans.
* Avoid swallow of solder paste as well as contact with skin or eyes.
* Equip with ventilation in a working place.
* During handling of paste flux, work in the well-ventilated place and avoid the inhalation of generated vapor.
* During handling, put on a protective mask, gloves, and goggles.
* Since this solder paste contents flammable substance, keep away from all sources of spark, heat, and flame.
* If solder paste should contact with skin, remove it immediately and wash out thoroughly in a running water for more than 15 minutes. See a doctor, if necessary.
* This solder paste must be stored in certain place such as refrigerator or well ventilated dark and cold place with little trespassing.
* Before handling, carefully read the Material Safety Data Sheet (MSDS) by Alpha Metals Japan Ltd. If there is no MSDS at your hand, please request us.

ALTHOUGH THE INFORMATION DESCRIBED HERE IS BELIEVED THE BEST AND NEWEST ON THE ISSUANCE DATE, THE COMPLETENESS AND ACCURACY OF THE INFORMATION SHOULD NOT BE GUARANTEED.
THERE MAY BE A CASE THAT ANY INFORMATION SHOULD BE REVISED FROM RED-HOT VIEWS.
MOST CAUTIONS SHOULD BE NECESSARY ON HANDLING THE PRODUCT SINCE THERE IS POSSIBILITY THAT ALL CHEMICALS MAY CONTAIN UNKNOWN TOXIN.
USER IS RESPONSIBLE TO MAKE A DECISION CONCERNING THE COMPATIBILITY OF THE PRODUCT.

[NA: Not Applicable, NE: Not Established, NL: Not Listed, UN: Unknown]

Cookson Electronics shared intelligence™

Applicable to 0402 Chip !

Solder Paste Omnix325 / OM325

【Lead-free Solder Paste for Ultra-fine Pitch Printing Application】

FEATURES

Solder Paste OM325 is a solder paste whose flux system meets the requirements of lead-free solder such as Sn/Ag/Cu type solder.

- The viscosity and thixotropy are stable at the time of continuous printing for more than 24 hours. This realizes a stable printing without the waste of solder paste.
- The flux, which is formulated using heat resistance resin, is applicable to high temperature pre-heating. Also the appearance of flux residues is clear.
- Printability has been promoted due to its improved rolling property.
- Solubility on ultra-fine pitch pads has been improved by using a unique activator system. It reduces the occurrence of solder ball, as well

APPLICATION

OM325 is formulated for fine pitch stencil application. Tack life is over 24 hours, although it depends on the condition. The following is an example of specification. Regarding metal content and viscosity, various specifications are available. Please contact us for further information on the different specifications.

Application	Alloy Composition	Metal Content	Powder Mesh Size	Viscosity (±200P)
Stencil Printing	SAC305 (Sn/3Ag/0.5Cu)	88.8%	500 mesh	1,900 P
		89.0%	400 mesh	

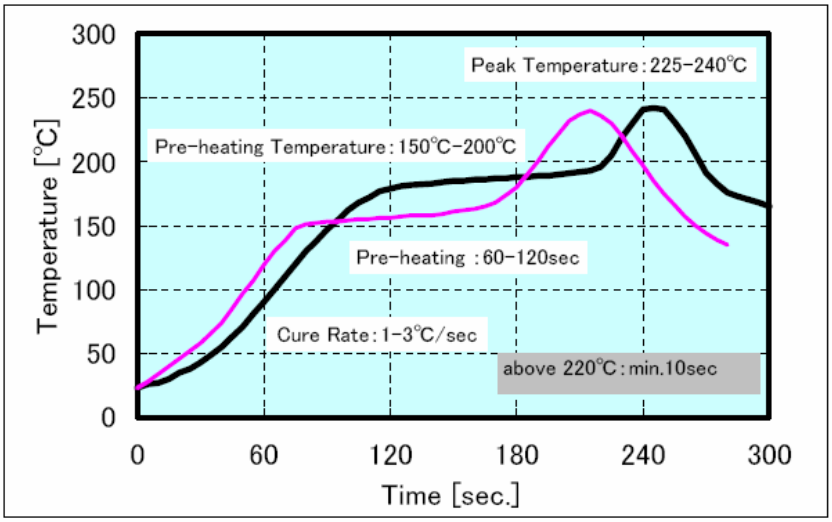
PROPETIES OF FLUX

Test Item	Results	Procedures
Flux Type	REL-0	IPC J-STD-004
Corrosion Test (Flux Residues)	No color changed. Pass.	JIS Z 3284 Appendix 4
Copper Mirror Corrosion Test	No copper peeled. Pass.	JIS Z 3197 8.4.2
Silver Chromate Paper Test	No color changed. Pass.	JIS Z 3197 8.1.4.2.3
Surface Insulation Resistance Test	$2.2\times10^{10}\Omega$	IPC J-STD-004
Surface Insulation Resistance Test	$9.2\times10^{11}\Omega$	BCR GR78-CORE
Migration Test	$>1.0\times10^{9}\Omega$ (@85℃/85%Rh/48Vdc/1000Hrs)	JIS Z 3284 Appendix 14
Wetting/Dewetting Test	Copper Plate: Class 2	JIS Z 3284 Appendix 10
Tack Force Test	>100 g·f (@24Hrs)	JIS Z 3284 Appendix 9
Hot Slump Test	No contact	JIS Z 3284 Appendix 8
Solder Ball Test	Flocculation Rate: 1	JIS Z 3284 Appendix 11

REMOVAL OF RESIDUES

Cleaning is not necessary since the flux residues exhibit excellent corrosion property and have high insulation resistance without cleaning. If necessary, 'EC-7 cleaner or EC-7R cleaner (Alpha Metals)' is available.

REFLOW PROFILE (5-zone Hot-air Reflow Oven)



HANDLING

(1) Store in a cool dark place. (@0-10℃)
(2) Set the printer and the dispenser at 23-25℃ and 40-60%RH.
(3) Before use, OM325 should be permitted to reach room temperature.
(4) Close the lid of the container after work.
(5) Never use the dry portion of the paste. Remove the dry portion before use.
(6) OM325 contains no organic solvent corresponding to the rules about specified chemical matters or organic. Nevertheless, avoid fume inhalation or skin contact.

PACKAGING

Available in 500g Plastic Jar

The use and the data herein were confirmed by the tests conducted by Alpha Metals.
Please conduct the test to confirm its applicability to your own use.
The information contained herein may change without any notice.

2004. Aug

Alpha Metals Japan Ltd.
480-28, Higashitoyoda,
Hiratsuka-shi, Kanagawa-ken
254-0082 Japan

Phone: (81)463-53-3333
(81)463-53-3390 (Sales Dep.)
Fax: (81)463-53-3311

(2) Rubber

SGS

材質技術資料及材質無鉛意書証明

Test Report No. SH304105-1/CHEM Date: 5.27.2003 Page 1 of 1

KUNSHAN GLORY SUN INDUSTRIAL CO., LTD
NO.1288-1, SHUIXIU ROAD, HIGH-TECH INDUSTRIAL PARK, KUNSHAN CITY, JIANGSU PROVINCE
THIS REPORT IS TO SUPERSEDE TEST REPORT NO.SH304105/CHEM DATE:23/05/03

The following sample(s) was/were submitted and identified on behalf of the applicant as:

Sample Description : SILICONE INTER-CONNECTOR
Buyer : LCM
Model : GSS-TYPE

Sample Receiving Date : May 20, 2003
Testing Period : May 20 to May 23, 2003

Test Requested :1) To determine Cadmium Content on the submitted sample.
2) To determine Lead Content on the submitted sample.

Test Method :1) With reference to BS EN 1122:2001, Method B.
Analysis was performed by Inductively Coupled Argon Plasma – Atomic Emission Spectrometry (ICP-AES) or Atomic Absorption Spectrometry.
2) With reference to US EPA Method 3050B.
Analysis was performed by Inductively Coupled Argon Plasma – Atomic Emission Spectrometry (ICP-AES).

Test Results :

Element	A
Cadmium (Cd)	N.D.
Lead (Pb)	3ppm

(Result shown is of the total weight of sample)

Sample Description:
A. Transparent/grey silcone rubber

Note : ppm = mg/kg
N.D.= not detected (Detection limit =<2ppm)

*** End of Report ***

Signed for and on behalf of
SGS-CSTC Chemical Laboratory

Ella Zhang
Supervisor

SHCH 100620

7/F & 10/F, the 3rd Building, No.889, Yishan Road, Xuhui District, Shanghai, China 200233 t +86 21 6495 1616*822 f +86 21 5450 0314
中国 上海 徐汇区宜山路889号3号楼7楼 10楼 邮编 200233 t +86 21 6495 1616*622 f +86 21 5450 0314 www.sussctc.com
Member of the SGS Group (Société Générale de Surveillance)

(3) Carriers

JAN-30-2004 14:00 YUAN-SHAN 033274548 9/9 P.01

SGS 台灣檢驗科技股份有限公司
SGS Taiwan Ltd.

136-1 Wu Kung Road, Wuku Ind. Zone,
Taipei County, Taiwan 248
Tel :(886-2)22993279
Fax:(886-2)22993237

丁○○陳○

測試項目： 1 測試樣品之重金屬含量是否符合歐洲 94/62/EEC 要求規格。

測試方法： 2 測試樣品之聚溴聯苯/溴聯苯醚(PBB/PBDE)、多氯聯苯(PCBs)

1 用感應耦合電漿原子發射光譜儀做分析。
2 用 GC/MS 及 GC/ECD/MS 做分析

測試結果：
單位：ppm(mg/kg)
1. 94/62/EEC 重金屬

Item	NO. 1
含鉛量	24.0
含鎘量	N.D.
含汞量	N.D.
含六價鉻量	N.D.
Pb+Cd+Hg+Cr^{+6}	24.0
94/62/EEC 限值	100

2. 聚溴聯苯/溴聯苯醚(PBB/PBDE)、多氯聯苯(PCBs)含量

測試項目	NO. 1
聚溴聯苯(PBB)	未檢出(<5.0)
溴聯苯醚(PBDE)	未檢出(<5.0)
多氯聯苯(PCBs)	未檢出(<0.5)

樣品敘述：
NO. 1 白色塑膠片

樣品測試日期： 2002/12/02-10

結論： 送檢之樣品的重金屬之含量符合歐洲 94/62/EEC 要求規格。

注意事項：一、本報告所記載事項僅作為參考資料，不得作為廣告、出版物等商業宣傳推銷之用。
二、本報告所用樣品與名稱係由委方提供，本實驗室僅負責試驗分析。
三、試驗報告塗改更正者無效。
四、測試結果僅對測試品有效。
五、除非獲得實驗室書面同意，樣品或報告不得摘錄複製，但全部複製除外。

Signed for and on behalf of
SGS TAIWAN Ltd.

04-10-12 10:44 BA +0227673426 T-139 P.02

[redacted]

SGS 台灣檢驗科技股份有限公司
SGS Taiwan Ltd.

248台北縣五股工業區五工路136-1號
136-1 Wu Kung Road, Wuku Ind. Zone,
Taipei County, Taiwan 248
Tel :(886-2)22993939 , 22993279
Fax:(886-2)22993237

Test Report

Report No: CY/2002/B2299
Date: 2002/12/10
Page : 1 OF 1

以下測試樣品乃供應廠商所提供及確認：

產品敘述: PS板(包裝材料)
收件日期: 2002/11/29

測試項目: 1 測試樣品之重金屬含量是否符合歐洲 94/62/EEC 要求規格。
2 測試樣品之聚溴聯苯/溴聯苯醚(PBB/PBDE)，多氯聯苯(PCBs)

測試方法: 1 用感應耦合電漿原子發射光譜儀做分析。
2 用 GC/MS 及 GC/ECD/MS 做分析

測試結果：
單位:ppm(mg/kg)
1. 94/62/EEC 重金屬

Item	NO. 1
含鉛量	24.0
含鎘量	N.D.
含汞量	N.D.
含六價鉻量	N.D.
$Pb+Cd+Hg+Cr^{+6}$	24.0
94/62/EEC 限值	100

2. 聚溴聯苯/溴聯苯醚(PBB/PBDE)，多氯聯苯(PCBs)含量

測試項目	NO. 1
聚溴聯苯(PBB)	未檢出(<5.0)
溴聯苯醚(PBDE)	未檢出(<5.0)
多氯聯苯(PCBs)	未檢出(<0.5)

樣品敘述:
NO.1 白色塑膠片

樣品測試日期： 2002/12/02~10

結論： 送檢之樣品的重金屬之含量符合歐洲 94/62/EEC 要求規格。

注意事項：一、本報告所記載事項僅作為參考資料，不得作為廣告、出版物等商業宣傳推銷之用。
二、本報告所用樣品與名稱係由委方提供，本實驗室僅負責試驗分析。
三、試驗報告數據更正者無效。
四、測試結果僅對測試品有效。
五、除非獲得實驗室書面同意，證書或報告不得摘錄複製，但全部複製除外。

Signed for [illegible] behalf of
SGS TAIWAN Ltd.

'04-10-12 10:44 BA +0227673426 T-139 P.01

(4)Carton

FROM : MING-HORNG;CO,LTD. FAX NO. : 30 Sep. 2004 05:34PM P1

SGS

Test Report

正隆股份有限公司
337桃園縣大園鄉北港村大工路116號

報告號碼 : CE/2003/C0732B
日期 : 2003/12/11
頁數 : 2 of 2

測試結果

測試部位 NO.1 : 棕色紙板

通過

測試項目:	單位	測試方法	偵測極限值	結果 NO.1					法規限值
94/62/EEC									
六價鉻	ppm	依照US EPA 7196A及3060A方法	2	N.D.					-
鎘	ppm	依照 EN1122 方法B:2001或其他酸消化方法,用感應耦合電漿原子發射光譜儀(ICP-AES)做分析	2	N.D.					-
鉛	ppm	依照 US EPA 3050B 方法或其他酸消化方法,用感應耦合電漿原子發射光譜儀(ICP-AES)做分析	2	21.4					-
汞	ppm	依照 US EPA 3052 方法或其他酸消化方法,用感應耦合電漿原子發射光譜儀(ICP-AES)做分析	2	N.D.					-
六價鉻+鉛+鎘+汞	ppm	六價鉻+鉛+鎘+汞總和(94/62/EEC)	-	21.4					100

備註:(1) N.D. = Not detected.(<MDL) / 未檢出(低於偵測極限值)
(2) ppm = mg/kg / 百萬分之一
(3) MDL= Method Detection Limit(偵測極限值)
(4) " ---" = Not Applicable / 未測項目
(5) " -" = Not Regulation / 無規格值
(6) **定性分析(無單位)
(7) Negative / 陰性(未偵測到), Positive / 陽性(已偵測到)

TW0462955

(5) Bezel

SGS

Test Report

APEX DISPLAY CO., LTD.
6F-2, NO. 15, LANE 174, SHIN-MING RD., TAIPEI
114, TAIWAN, R. O. C.

Report No. : CE/2004/C1767
Date : 2004/12/16
Page : 1 of 2

The following merchandise was (were) submitted and identified by the client as :

Type of Product : COATING LCD BEZEL
Sample Received : 2004/12/09
Testing Date : 2004/12/09 TO 2004/12/16

==

Test Result

PART NAME NO.1 : BLACK METAL(PLEASE REFER TO THE PHOTO ATTACHED)

Test Item (s):	Unit	Method	MDL	Result				
				No.1				
Chromium VI (Cr+6)	ppm	As per US EPA 7196A and US EPA 3060A.	2	N.D.				
Cadmium (Cd)	ppm	ICP-AES after as per EN 1122, method B:2001 or other acid digestion.	2	N.D.				
Mercury (Hg)	ppm	ICP-AES after as per US EPA 3052 or other acid digestion.	2	N.D.				
Lead (Pb)	ppm	ICP-AES after as per US EPA 3050B or other acid digestion.	2	N.D.				

NOTE: (1) N.D. = Not detected (<MDL)
(2) ppm = mg/kg
(3) MDL = Method Detection Limit

Daniel Yen, M.R. / Operation Manager
Signed for and on behalf of
SGS TAIWAN LTD.

TW 1374282

SGS Taiwan Ltd. 台灣檢驗科技股份有限公司 | No. 33 Wu Chyuan Road, Wuku Industrial Zone, Taipei County, Taiwan. /台北縣五股工業區五權路33號
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Member of SGS Group

SGS

Test Report

APEX DISPLAY CO., LTD.
6F-2, NO. 15, LANE 174, SHIN-MING RD., TAIPEI
114, TAIWAN, R. O. C.

Report No. : CE/2004/C1767
Date : 2004/12/16

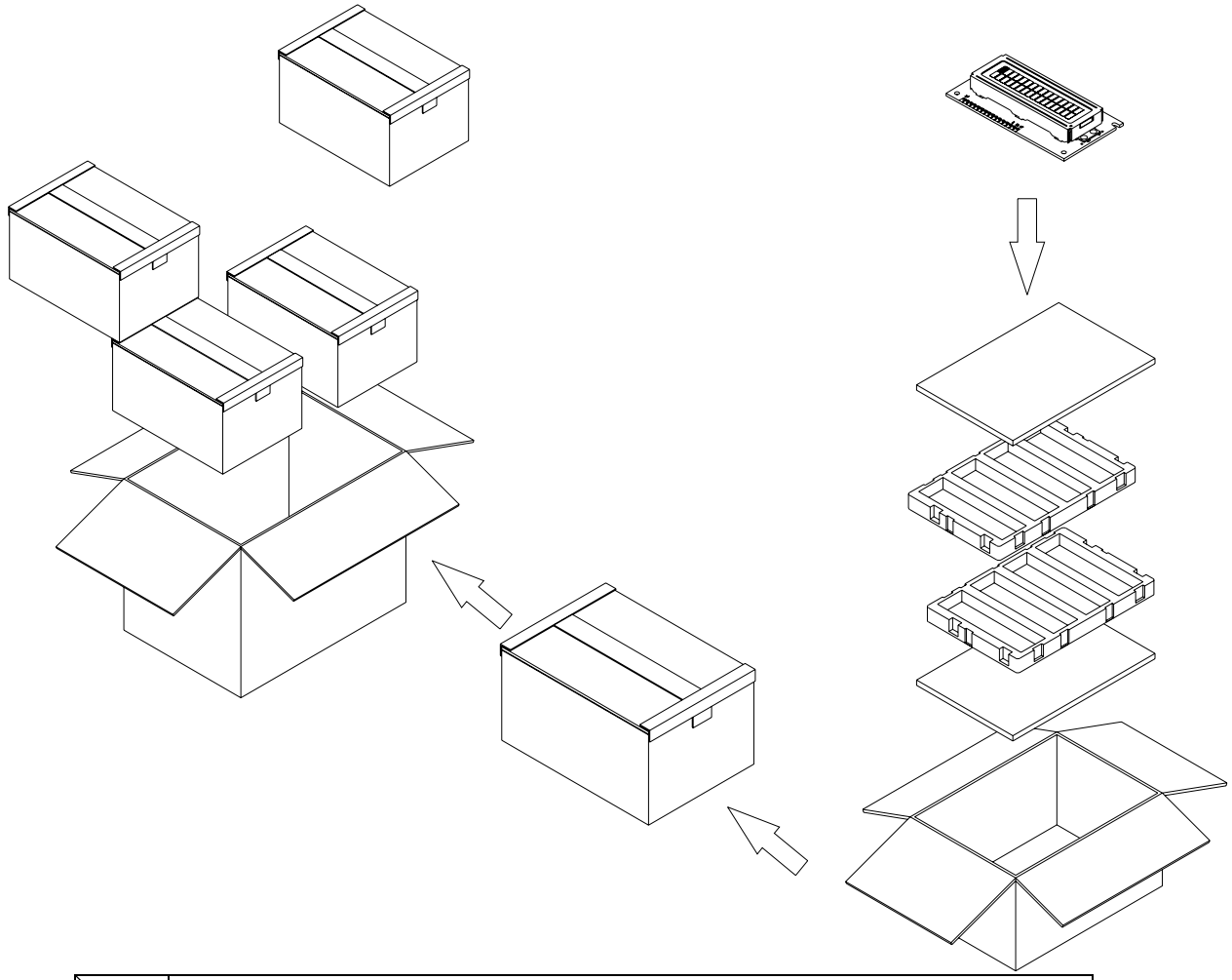
TW 1374283

SGS Taiwan Ltd. 台灣檢驗科技股份有限公司 | No. 33 Wu Chyuan Road, Wuku Industrial Zone, Taipei County, Taiwan. /台北縣五股工業區五權路33號
t (886-2) 2299-3939 f (886-2) 2299-3237 www.tw.sgs.com
Member of SGS Group

16 PACKING Drawing

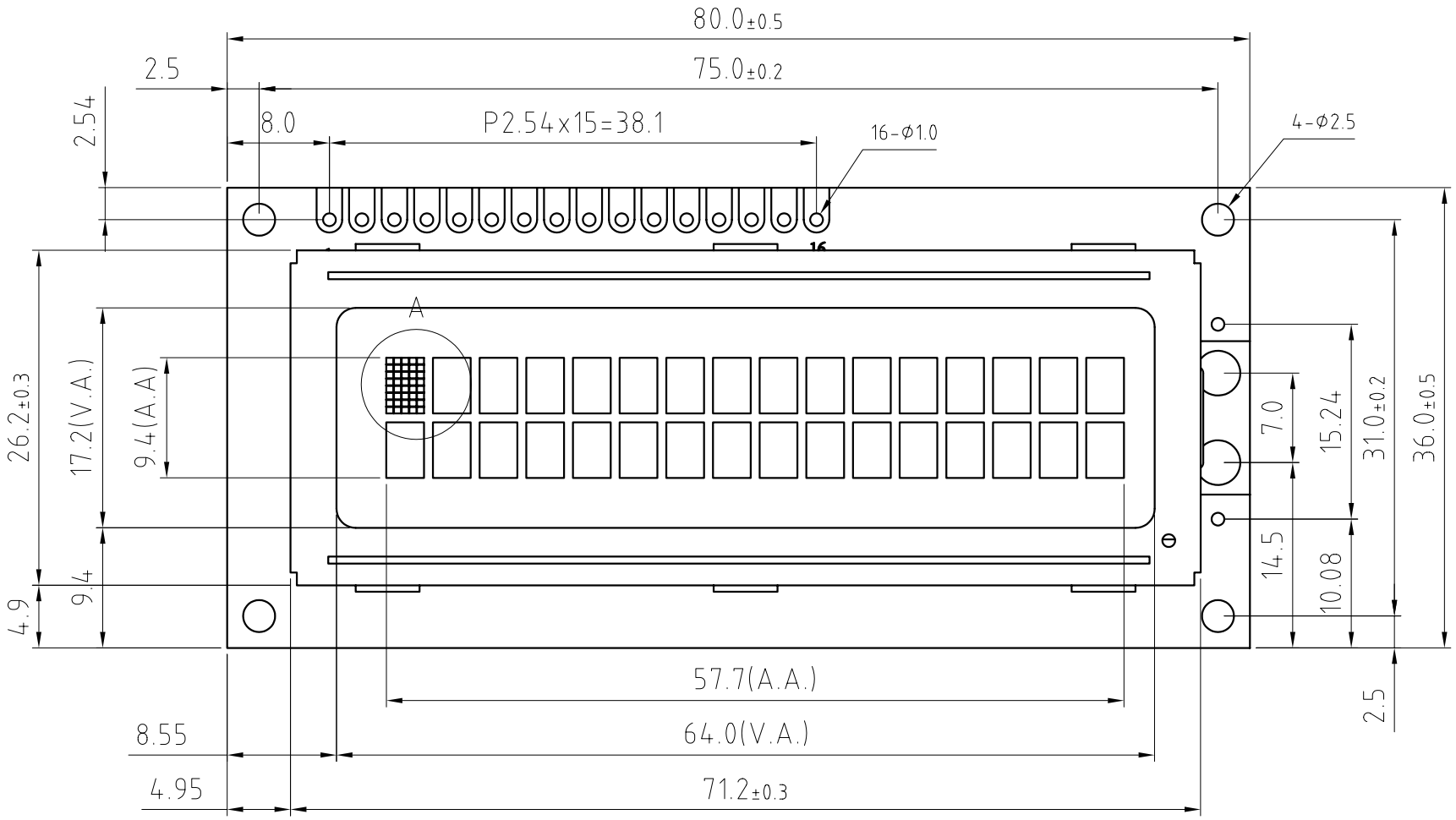
(1) Package quantity in inner box :108 PCS

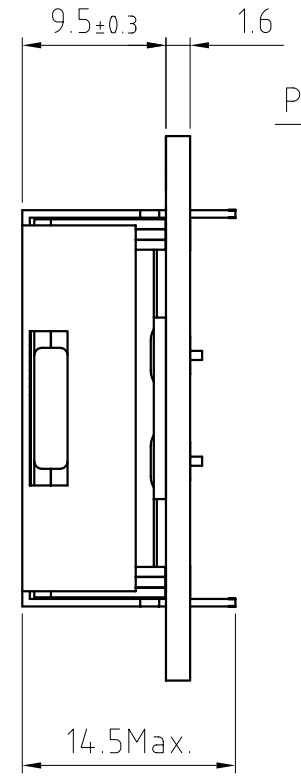
(2) Packing Drawing:

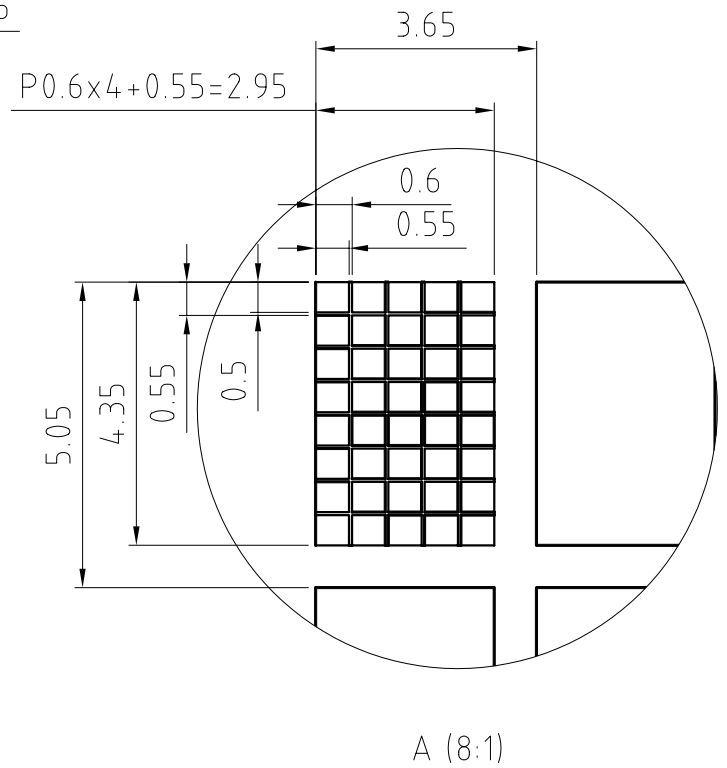


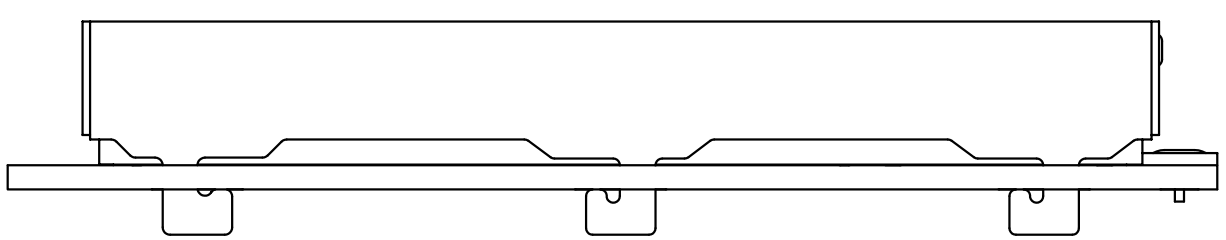
	PARTS LIST			
	ITEM	SIZE(LxWxH) mm	MATERIAL	Q.T.Y
1	PRODUCT	80.0x36.0x14.5	--	432
2	ANTI-STATIC BAG	100x100x0.08	--	432
3	EPE	306x194x10	EPE	8
4	TRAY	300x200x165	PET	36
5	INNER BOX	321x209x185	CARTON	4
6	EXTERNAL BOX	455x339x415	CARTON	1

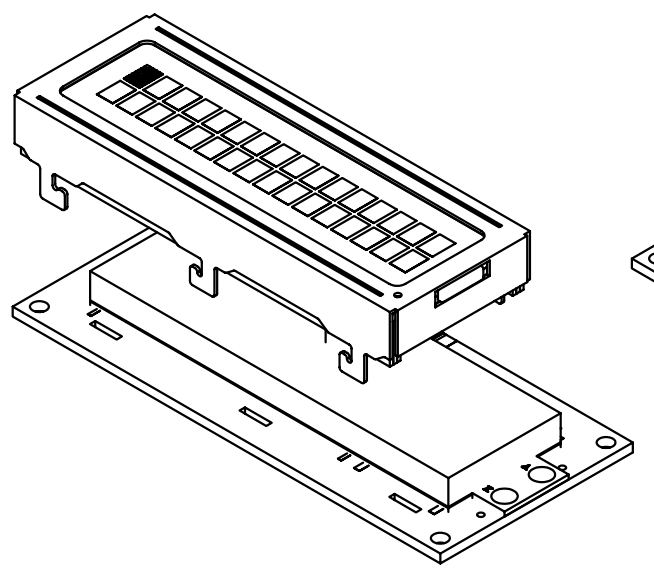
INTERFACE															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
VSS	VDD	V0	RS	R/W	E	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7	A/EL1	K/EL2

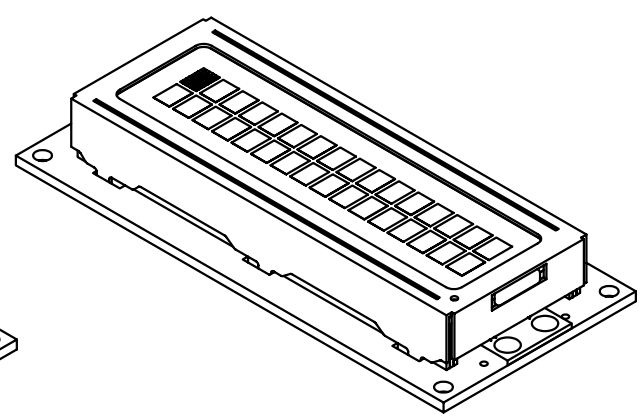












						*	*	*	
APEX DISPLAY CO.,LTD. 晶英光電科技股份有限公司	Check BY	Sam	Approved BY	Natty	Date 2005/02/24	Scale 2:1	Product No.	TITLE	Drawing No.
	Drawn BY	Chris			Projection Type	UNIT mm	AXSC162C	LCM DWG	AXSC162C-A-02-02