# Crystal Clear Technology

## **Product Specification**

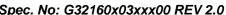
G32160x03xxx00

(WITH CHINESE CHARACTER OPTION)

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## 2.0 Record of revision

Rev	Date	Item	Page	Comment	Originator	Checked By
1.0	15/09/10			Initial Release	SCChong	Azhar
2.0	22/07/11			Add Character ROM	SCChong	Azhar



#### 3.0 General specification

Display format: Graphics 160 (w) x 32 (h) dots

Dot size: 0.57 (w) x 0.57 (h) mm

Dot pitch: 0.60 (w) x 0.60 (h) mm

View area: 99.0 (w) x 24.0 (h) mm

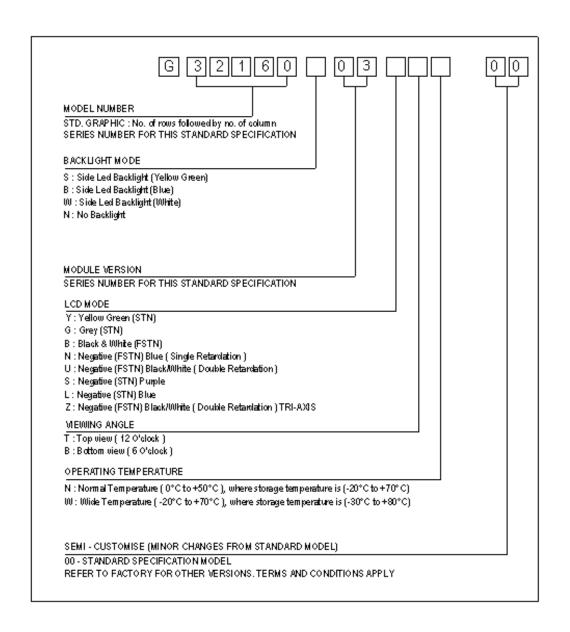
Active area: 95.97 (w) x 19.17 (h) mm

General dimensions: 122.0 (w) x 44.0 (h) x 13.6 max (t) mm

Controller/Driver: ST7920-0B and ST7921 or equivalent

Interface: Parallel

Driving method: 1/32 duty



## CRYSTAL CLEAR TECHNOLOGY SDN. BHD.



Spec. No: G32160x03xxx00 REV 2.0

### 4.0 Absolute maximum rating (at Vss = 0V, ambient temperature = 25°C)

NO	ITEM	SIMBOL	MIN	MAX	UNIT
1.	Power Supply Voltage (Logic)	$V_{ m DD}$ - $V_{ m SS}$	-0.3	6.0	V
2.	Power Supply Voltage (LCD Driver)	$V_{DD} - V_{EE}$	-0.3	7.0	V
3.	Operating Temperature	T <sub>op</sub>	Refer p	°C	
4.	Storage Temperature	$T_{st}$	Refer p	age 3	°C

#### 5.0 Electrical characteristics

NO	ITEM	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
1.	Power Supply Voltage (Logic)	$V_{DD} - V_{SS}$	-		5.0	5.5	V
2.	Power Supply Voltage (V <sub>LCD</sub> )	$V_{ m DD} ext{-}V_{ m EE}$	25°C		V		
3.	Input Voltage	$egin{array}{c} V_{ m IH} \ V_{ m IL} \end{array}$	-	0.7 V <sub>DD</sub> -0.3	-	V <sub>DD</sub> 0.6	V
4.	Current Supply	$I_{DD}$	$V_{DD} - V_{SS} = 5V$ $V_{DD} - V_{EE} = 5V$	-	0.8	1.0	mA

## 5.1 Backlight Options

NO	COLOR	FORW	ARD VO (V)	LTAGE	FORW	ARD CUI	MIN BRIGHTNESS	
		Min	Тур.	Max	Min	Тур.	Max	(cd/m2) *
1.	White	-	5.0	-	-	40	50	200

\*Note: 1. Brightness measured at backlight surface.

2. On LCD surface, brightness is only about 10% to 15% of backlight brightness.

3. Backlight lifetime: For White, Green = 20K hrs \* \*(Condition: If = typical current and Ta = 25°C)

## 6.0 Environmental requirements

NO	ITEM	CONDITION
1.	Operating Temperature	Refer page 3
2.	Storage Temperature	Refer page 3
3.	Operating Humidity	5% to 95%RH
4.	Cycle Test	0 C @ 30 min to 50 C @ 30min for 1 cycle run for 10 cycles
5.	Lifetime	50000 HOURS (excluding backlight)

Note: The background on LCD has the possibility to be changed in different temperature range.



7.0 Electro-optical characteristics (at ambient temperature,  $Ta = 25^{\circ}C$ )

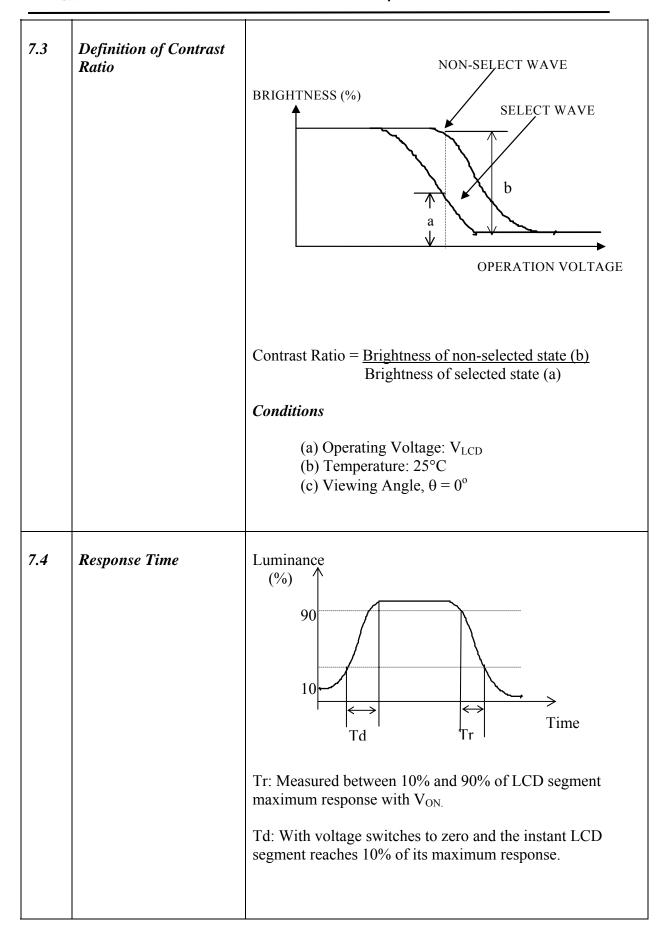
						L	CD TYP	E					
NO ITEM SYMBOL		CONDITION	STN YG	STN GREY	STN -VE BLUE/ PURPLE	FSTN +VE B/W	FSTN -VE BLUE	FSTN - VE TRUE B/W	FSTN -VE TRI AXIS	REF.			
1	Operating Voltage (Volt)	$V_{LCD}$	$\theta = 0$ $Cr = max$			2	4.7 ± 5%				7.1		
	θ x 1		+25	+20	+35	+25	+35	+35	+40				
2	Viewing Angle	θ x 2	$CR \ge 2$	-25	-20	-35	-25	-35	-40	-40	7.2		
	(Deg)	θу1	$V_{LCD} = 4.7V$	-30	-25	-35	-30	-35	-35	-50	7.2		
	(208)	θу2	1., ,	+30	+25	+35	+30	+35	+35	+30			
3	Contrast Ratio	CR	$\theta = 0^{0}$ $V_{LCD}$ $= 4.7V$	3.0	2.3	6.0	3.0	6.0	20	20	7.3		
Response		Rise Time (Tr)	$\theta = 0_0$		200								
4	Time (msec)	Decay Time (Td)	$\theta = 0_0$				250				7.4		

#### Note:

- 1. Viewing angle data is based on bottom view product by default. Should it be a top view product, values are then swap.
- 2. Contrast ratio is based on typical data when using white colour as backlight.
- 3. Equipment Used Eldim; Ez Contrast 120R, Spot Size = 2mm

NO	CHARACTERISTICS	<u>DEFINITIONS</u>
7.1	Definition of Operating Voltage (V <sub>LCD</sub> )	$V_{LCD}$ $V_{LCD}$ : Operating Voltage F: Frame Frequency
7.2	Definition of Viewing Angle	TOP θ REAR FRONT   BOTTOM
		REAR ( $\theta$ y2)  LEFT( $\theta$ x2)  RIGHT( $\theta$ x1)  FRONT ( $\theta$ y1)









#### 8.0 Interface

8.1	Controller	ST7920-0B	OR EQUIVALENT				
8.2	Display Driver	ST7921 OR 1	EQUIVALENT				
8.3	Duty Cycle	1/32					
8.4	Pin-out Assignments						
	Pin No	Symbol	Description				
	1	V <sub>SS</sub>	Ground terminal of module				
	2	$V_{ m DD}$	Supply terminal of module				
	3	$V_{ m ADJ}$	Power supply for Liquid Crystal Drive				
	4	RS	Parallel Mode: Register select.  0: Select instruction register (write) or busy flag, address counter (read);  1: Select data register (write/read).				
	5	R/W	Parallel Mode: Read/Write control.  0: Write;  1: Read.				
	6	Е	Parallel Mode: 1: Enable trigger.				
	7 to 14	DB0 to DB7	Data bus line				
	15	A	Backlight supply				
	16	K	Backlight ground				



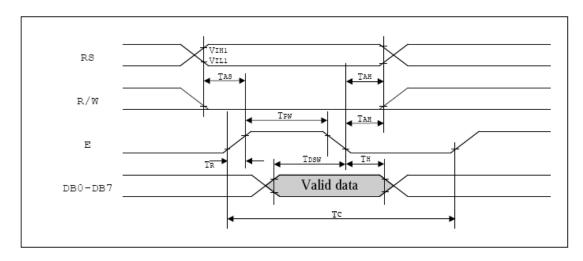




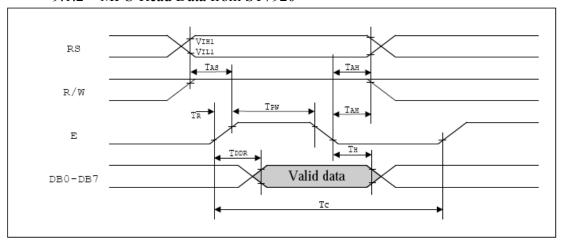
## 9.0 Functional Descriptions

## 9.1 Display Control Timing Waveform and Characteristics

#### 9.1.1 MPU Write Data to ST7920



#### 9.1.2 MPU Read Data from ST7920





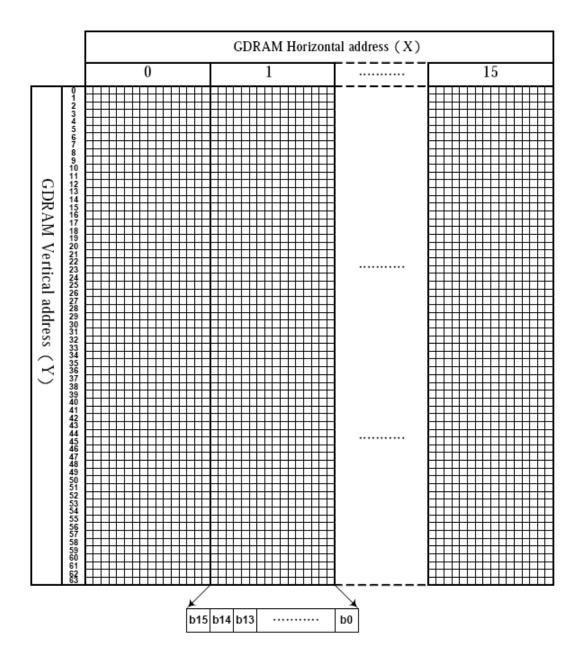
## AC Characteristics (T<sub>A</sub> = -30 $^{\circ}$ C ~ 85 $^{\circ}$ C, V<sub>DD</sub> = 4.5V) Parallel Mode Interface

Symbol	Characteristics	Test Condition	Min.	Тур.	Max.	Unit						
		Internal Clock Operation	)									
fosc	OSC Frequency	$R = 33K\Omega$	480	540	600	KHz						
		External Clock Operation	1									
$f_{EX}$	External Frequency	-	480	540	600	KHz						
	Duty Cycle	-	45	50	55	%						
$T_R, T_F$	Rise/Fall Time	-	-	-	0.2	μS						
Write Mode (Writing data from MPU to ST7920)												
Tc	Enable Cycle Time	Pin E	1200	-	-	ns						
T <sub>PW</sub>	Enable Pulse Width	Pin E	140	-	-	ns						
$T_R, T_F$	Enable Rise/Fall Time	Pin E	-	-	25	ns						
T <sub>AS</sub>	Address Setup Time	Pins: RS,RW,E	10	-	-	ns						
T <sub>AH</sub>	Address Hold Time	Pins: RS,RW,E	-	-	ns							
T <sub>DSW</sub>	Data Setup Time	Pins: DB0 - DB7	40	-	-	ns						
T <sub>H</sub>	Data Hold Time	Pins: DB0 - DB7	20	-	-	ns						
	Read Mode (Reading Data from ST7920 to MPU)											
Tc	Enable Cycle Time	Pin E	1200	-	-	ns						
T <sub>PW</sub>	Enable Pulse Width	Pin E	140	-	-	ns						
$T_R, T_F$	Enable Rise/Fall Time	Pin E	-	-	25	ns						
T <sub>AS</sub>	Address Setup Time	Pins: RS,RW,E	10	-	-	ns						
T <sub>AH</sub>	Address Hold Time	Pins: RS,RW,E	20	-	-	ns						
T <sub>DDR</sub>	Data Delay Time	Pins: DB0 - DB7	-	-	100	ns						
T <sub>H</sub>	Data Hold Time	Pins: DB0 - DB7	20	-	-	ns						
	Interfac	ce Mode with LCD Driver(	ST7921)	)								
T <sub>CWH</sub>	Clock Pulse with High	Pins: CL1, CL2	800	-	-	ns						
T <sub>CWL</sub>	Clock Pulse with Low	Pins: CL1, CL2	800	-	-	ns						
T <sub>CST</sub>	Clock Setup Time	Pins: CL1, CL2	500	-	-	ns						
Tsu	Data Setup Time	Pin: D	300	-	-	ns						
T <sub>DH</sub>	Data Hold Time	Pin: D	300	-	-	ns						
T <sub>DM</sub>	M Delay Time	Pin: M	-1000	-	1000	ns						

Timing Interface with 6800 series MPU



9.2 Relationship between GDRAM display coordinates and corresponding address





#### 10. Instruction Set

#### Instruction Set 1: (RE=0: Basic Instruction)

Inst.					Со	de					Description	Exec time
ınsı.	RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Description	(540KHZ)
Display Clear	0	0	0	0	0	0	0	0	0	1	Fill DDRAM with "20H" and set DDRAM address counter (AC) to "00H".	1.6 ms
Return Home	0	0	0	0	0	0	0	0	1	х	Set DDRAM address counter (AC) to "00H", and put cursor to origin : the content of DDRAM are not changed	72 us
Entry Mode Set	0	0	0	0	0	0	0	1	I/D	s	Set cursor position and display shift when doing write or read operation	72 us
Display Control	0	0	0	0	0	0	1	D	С	В	D=1: Display ON C=1: Cursor ON B=1: Character Blink ON	72 us
Cursor Display Control	0	0	0	0	0	1	S/C	R/L	х	х	Cursor position and display shift control; the content of DDRAM are not changed	72 us
Function Set	0	0	0	0	1	DL	х	0 RE	х	х	DL=1 8-bit interface  DL=0 4-bit interface  RE=1: extended instruction  RE=0: basic instruction	72 us
Set CGRAM Address.	0	0	0	1	AC5	AC4	AC3	AC2	AC1	AC0	Set CGRAM address to address counter (AC)  Make sure that in extended instruction SR=0 (scroll or RAM address select)	72 us
Set DDRAM Address.	0	0	1	0 AC6	AC5	AC4	AC3	AC2	AC1	AC0	Set DDRAM address to address counter (AC) AC6 is fixed to 0	72 us
Read Busy Flag (BF) & AC.	0	1	BF	AC6	AC5	AC4	AC3	AC2	AC1	AC0	Read busy flag (BF) for completion of internal operation, also Read out the value of address counter (AC)	0 us
Write RAM	1	0	D7	D6	D5	D4	D3	D2	D1	D0	Write data to internal RAM (DDRAM/CGRAM/GDRAM)	72 us
Read RAM	1	1	D7	D6	D5	D4	D3	D2	D1	D0	Read data from internal RAM (DDRAM/CGRAM/GDRAM)	72 us

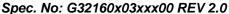
#### Instruction set 2: (RE=1: extended instruction)

Inst.					Со	de					Description	Exec time
ınsı.	RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Description	(540KHZ)
Standby	0	0	0	0	0	0	0	0	0	1	Enter standby mode, any other instruction can terminate. COM132 are halted.	72 us
Scroll or RAM Address. Select	0	0	0	0	0	0	0	0	1	SR	SR=1: enable vertical scroll position SR=0: enable CGRAM address (basic instruction)	72 us
Reverse (by line)	0	0	0	0	0	0	0	1	R1	R0	Select 1 out of 4 line (in DDRAM) and decide whether to reverse the display by toggling this instruction R1.R0 initial value is 0.0	72 us
Extended Function Set	0	0	0	0	1	DL	х	1 RE	G	0	DL=1 :8-bit interface  DL=0 :4-bit interface  RE=1: extended instruction set  RE=0: basic instruction set  G=1 :graphic display ON  G=0 :graphic display OFF	72 us
Set Scroll Address	0	0	0	1	AC5	AC4	AC3	AC2	AC1	AC0	SR=1: AC5~AC0 the address of vertical scroll	72 us
Set Graphic Display RAM Address	0	0	1	0	0 AC5	l			AC1 AC1	l	Set GDRAM address to address counter (AC) Set the vertical address first and followed the horizontal address by consecutive writings Vertical address range: AC5AC0 Horizontal address range: AC3AC0	72 us



## 10.1 Character ROM with alphanumerical fonts (16 x 8 dots)

	0	1	2	3	4	5	6	7	8	9	A	В	C	D	E	F
00		9	8	¥	*	٠	÷	•	٠	0	0	ď	Ŷ	ŗ	Ŋ	*
10	F	4	‡	!!	q	δ	_	ŧ	t	ţ	<b>→</b>	+	L	**	▲	₹
20		•	•••	#	\$	%	&	,	(	)	×	+	,	_	•	7
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	6	A	В	С	D	E	F	G	Н	Ι	J	K	L	M	N	0
50	P	Q	R	S	T	U	V	Ш	X	Y	Z	E	\	1	^	
60	•	a	ь	C	d	е	f	g	h	i	j	k	1	m	n	o
70	p	q	r	s	t	u	v	W	×	y	z	{	ł	}	~	Δ





#### 10.2 Character ROM with Chinese fonts (16 x 16 dots)



ST7928-8B-Z/6-VC1.Z
0 1 2 3 4 5 6 7 8 9 A B C D E F 0 1 2 3 4 5 6 7 8 9 A B C D E F
B9A8 啊阿埃埃哎唉哀皑瘤蔼矮艾碍爱隆B8A8 浮涪福袱弗甫抚辅俯盖斧脯腑府腐
BBBB 較氨安 俺按暗岸 脫案 肮量盎 凹款熬翱 BBBB 赴副 覆赋复 傅付卓父 腹负 富让 附妇缚
BOCO 长傲奥(奥)
BODO 把把把坝露黑老白柏百摆佰败拜稗斑 BODO 感秆敢警区刚钢缸肛纲岗港杠篙皋高
BBEN 班搬 板 級 版
BBF8柳榜勝绑棒磅蚌接榜诱苞跑包褒到 BBF8 氢格蛤阁隔铭个各给根跟耕更庚羹 B1A8 薄雹保堡地宝抱报暴豹鲍爆杯碑悲B9A8 埂款梗工吹功恭龚供躬公宫弓巩汞
B186 卑北辈背贝钡倍狈备惫焙被奔苯本苯B986拱贡共钩勾沟苟狗垢构购够辜菇咕箍 B186 卑犯要有關进得馬比别给猪碧菌素的pace供法剂吐鼓士电鲁公路拉顾国房利瓜
9100期期用永姆四周男氏配毛恢有影似于99001010%为数百重月节放吹以周围的点 9488以毛术通知散散力隐除壁迹即植为pong则富井进乐块体分学方字可等分域性
B1Cel崩绷南泵蹦进逼鼻比鄙笔彼碧蓖蔽毕B9Cel估沽孤姑鼓古蛊骨谷股故顾固雇刮瓜 B1Del毙忠币庇痹闭敝弊必辟壁臂避陛鞭边B9De别宴挂褂乖拐怪棺关官冠观管馆罐惯 B1Eel编贬扁便变下辨辩辩遍标彪膘表鳖憋B9Eel灌贯光广逛现规圭硅归龟国轨鬼诡癸
BIF8別瘪彬斌灏滨宾摈兵冰柄丙栗饼炳 B9F8桂柜鼢贵刽辊滚棍锅郭国果裹过哈
B2A8 病并玻蓝播拨钵波博勃搏铂箔伯帛BAA8 骸孩海氯亥害骇酣憨邯韩含涵寒函
B2B8舶脖膊渤泊緊捕下哺补埠不布步續部BAB8喊罕翰越捍旱國悍焊汗汉夯杭航壕壕
BZCB怖擦猜栽材才财睬踩采彩菜蒸餐参至BACB豪夏郝好耗号浩呵喝荷菏核禾和何合
BZC8情擦清栽材才财睬踩采彩菜萘饜参蚕BAC8豪毫郝好耗号浩呵喝荷荷核禾和何合 BZD8残惭惨灿苍舱仓沧藏操糙槽曹草则策BAD8盒貉氮河涸赫褐鹤贺哩黑痕很狠恨哼
B2E0侧册测层跨插叉茬茶查碴搽察岔差诧BAE0亨横衡恒轰哄烘虹鸿洪宏弘红喉侯猴
BZF8拆柴豺搀掺蝉馋谗缠铲产阐颤昌猖 BAF8吼厚候后呼乎忽瑚壶葫胡蝴狐糊湖
B3A8 场尝常长偿肠厂敞畅唱倡超抄钞朝BBA8 弧虎唬护互沪户花哗华猾滑画划化
B3B0朝潮巢吵炒车扯撤掣彻澈郴臣辰尘晨BBB0话槐徊怀淮坏欢环桓还缓换患唤痪豢
BBCH快沉陈趁衬撑称城橙成呈乘程惩澄诚BBCH焕澳宦幻荒慌黄磺蝗簣皇凰惶煌晃幌
B3D8承温骋秤吃痴持匙池迟弛驰耻齿修尺BBD8恍谎灰挥辉黴恢蛔回毁悔慧卉惠晦贿 B3E8赤翅斥炽充冲虫崇洒抽酬畴踌癎愁筹BBE88秽会烩汇讳诲绘荤昏婚魂浑混豁活伙
B3E8亦刻斥炽充冲虫宗应抽酬畴踌梢愁病BBE8楼会发汇请请绘军昏殖魂阵混酚馆伙
B3F8仇绸瞅丑臭初出橱厨路锄雏滁除楚 BBF8火获或惑霍货祸击圾基机畸稽积算
B4A8 础储矗播触处揣川穿橡传船喘串疮BCA8 肌饥迹激讥鸡姬绩缉吉极棘辑籍集
B4B0 窗幢床间创吹炊捶锤垂春椿醇唇淳纯BCB0 及急疾汲即嫉怒挤几者己蓟技翼季伎
B4CB蠢戳绰疵茨磁雌辞慈瓷词此刺赐次聪BCCB祭剂修济寄家计记既忌际妓继纪嘉枷
B4D8 葱囱匆从丛凑粗醋簇促蹿篡窜摧崖催BCD8 夹佳家加莱颊贾甲钾假核价架驾嫁歼
B4E8施库粹淬翠村存寸磁撮搓措挫错搭达BCE8监坚尖笺间煎兼肩艰奸缄茧检束磁硷 B4F8答磨打大果歹佛戴带殆代贷袋待逮 BCF8拣检简俭剪减荐槛鉴践贱见键箭件
BSAB 怠耽担丹单郸掸胆且氮但惮淡延弹BDAB 健舰创线渐溅涧建僵姜将浆江疆蒋BSBB蛋当挡党荡档刀捣蹈倒岛祷导到稻悼BDBB桨奖讲匠酱降蕉椒碱焦胶交郊浇骄娇
B5ca 道盜德得的蹬灯登等瞪凳邓堤低滴迪BDCa 嚼搅铰矫侥脚狡角饺缴绞剿教酵轿较
BSDB飲食以後程嫡抵底地蒂第帝弟遠鄉颠BDDB叫客揭接皆秸街附數劫节桔杰捷睫竭
BSDB 敌笛狄涤翟嫡抵底地蒂第帝弟递締颠BDDB 叫害揭接皆秸街阶截劫节桔杰捷睫竭 BSEB 掂溴碘点典靛垫电佃甸店惦莫淀駁礀BDEB 洁结解姐戒藉芥界借介疥滅届巾筋斤
BSF8叼雕洞刁掉吊钓调跌参碟蝶选谋叠 BDF8金今津襟紧锦仅谨进斩音禁近烬浸
BGAN 丁町叮钉顶鼎锭定订丢东冬重懂动BEAN 尽劲荆棘茎睛晶鲸京惊精梗经井警
B6AB 丁町叮钉顶鼎锭定订丢东冬董懂动BEAB 尽劲荆兢茎睛晶鲸京惊精粳经井警 B6BB栋侗恫冻洞兜抖斗陡豆逗痘都督毒辏BEBB景颈静境敬镜径痉靖竟竟净炯窘揪究
B6Cel独读墙睹赌杜镜肚度渡炉端短翻段断BECel纠玖非久灸九酒腐救旧臼翼咎就疚鞠
B6Del缎堆兑队对墩吨蹲敦顿囤钝盾遁掇哆BEDel拘狙疽居胸菊局咀矩举沮聚拒据巨具
B6E8多夺垛躲呆跺舵剁惰堕鲯鯸鸈俄额讹BEE8距踞锯俱句惧炬剧捐鹃娟倦眷卷绢掇
B6F0  娥恶厄扼過鄂饿恩而儿耳尔饵洱二  BEF0  攫袂掘偏爵觉决诀绝均菌钧军君峻
B7AB 或发罚筏伐乏阀法珏藩帆番翻樊矾BFAB 发效浚郡骏喀咖卡咯开揩揩勚慨刊
B7Be 钒繁凡烦反返范贩犯颁泛坊芳方肪房BFBe 堪勘坎砍着康康糠扛抗亢炕考拷烤靠
B7CB防妨仿访纺放菲非理飞肥匪诽吠肺废BFCB坷苛柯棵磕颗科壳咳可渴克刻客课肯
B?De佛罗芬酚吩氰分纷坟焚汾粉奋份念愤BFDe啃垦恳坑吭空恐孔控抠口扣寇枯哭窟 B?Ee粪丰封枫蜂峰锋风疯烽逢冯缝顷奉凤BFEe苦酷库裤夸垮挎跨膀块筷侩快宽款国 B?Fe怫否夫敷肤孵扶拂辐幅氯符伏俘服 BFFe筐狂框矿眶旷况亏盔岿窥葵奎魁傀
B7E8] 类丰封枫蜂蜂蜂风疯烽逢冯维讽奉凤BFE8 苦酷库裤夸垮挎跨膀块筷侩快宽款国
B7F0怫否夫敷肤解扶拂辐幅氯符伏俘服 BFF0筐狂框矿眶旷况亏盈岿窥葵奎魁傀

\$T7920-0B-3/6-VC1.2
0 1 2 3 4 5 6 7 8 9 A B C D E F 0 1 2 3 4 5 6 7 8 9 A B C D E F
[CBA6] 馈愧溃坤昆捆困括扩廓阔垃拉喇蜡[CBA6] 取娶鲷趣去圈额权醛泉全痊拳大类
C0B0  開辣啦菜来赖蓝芸档拦篮  爾兰澗谰撒  C8B0  劝缺炔瘸却鹊榷确雀裙群然燃冉染
caca览懒缆烂滥琅榔狼廊郎朗浪捞劳牢老 caca壤攘嚷让饶扰绕惹热壬仁人忍韧任\
Capa 老姥酪烙涝勒乐雷镭蕾磊累儡垒擂肋 Capa 刃妊织扔仍日戎茸蓉荣融熔溶容绒?
C0E0类泪棱楞冷厘型型裂篙狸离漓理李里C8E0揉柔肉茹蟾儒孺如辱乳汝人褥软阮&
care鲤礼莉茲吏栗丽厉勋砾历利傈例例 care瑞锐闰狥若弱撒洒萨腮鳃塞赛三拳
[C146] 痢立粒沥肃力璃哩俩联莲连镰廉怜[C946] 伞散桑噪丧搔骚扫嫂瑟色涩森僧的
C186  注帘敛脸链恋炼练粮凉梁梁良两辆量C986  砂杀剃沙纱傻啥煞筛晒珊苫杉山删炼
C1Ce晾亮谅捺聊僚疗婚寥辽潦了撂镣廖料C9Ce衫闪陕擅赡膳善汕扇缮墙伤商赏晌」
[C1D8列裂烈劣猎蹄林磷霜临邻鳞淋凛贯  G1D8  尚裳梢梢梢梢烷芍勺韶少哨邵紹奢赊螂
[C1E6拎時 菱零餘 铃停 跨 凌灵 陵岭领另 今溜 C9E6舌 舍 敖摄射懷形 社设砷 申  申身深
C1F6  玩榴
czae 隆垄拢陇楼姜撰篓漏陋芦卢颅庐炉caae 省盛刺胜圣师失狮施湿诗尸虱十7
C286据  齿虏  鲁麓碌露  路路庵  路禄录陆  戮贮  CAB6拾  时   食蚀实识  史矢使屎驶始式示
czce吕铝侣旅履屡缀虑氯律率氮绿峦挛挛cace世柿事拭誓逝势是噹噬适仕侍释饰P
C2D8深卵乱掠略抡轮伦仑沦纶论萝螺罗逻CAD8市特室视试收手首守寿授售受瘦兽商
[C2E0锣箩骡裸落洛骆络妈麻玛码蚂马骂嘛CAE0枢杭殊抒输叔舒淑疏书赎孰孰薯暑顺
C2F6吗埋买麦卖迈脉瞒馒蛮满蔓曼慢慢   CAF6署蜀黍鼠属术述树束戍竖墅庶数樕
C3A8   慢芒花盲氓忙拳猫茅锚毛矛铆卵茂  C8A8   恕刷要摔轰甩帅栓拴霜双爽谁水顺
C380  冒帽貌  贺么政村 梅露霉煤  没眉媒镁每 C880  税吮瞬  顺柔脱硕朔! 炽斯撕嘶思私同地
icace美昧寐妹媚门闷们萌蒙檬盟锰猛梦孟cace死肆寺嗣四伺似饲已松耸怂颂送宋说
C3D6眯醚摩糜迷谜弥米秘觅泌蜜密幂棉眠C8D6诵搜艘数嗽苏酥俗素速栗僳塑溯宿诉
C3E6综冕免勉娩缅面苗描瞄藐秒渺庙妙蔑CBE6肃酸蒜算虽隋随绥瞻碎岁糠遂隧崇孙
C3F8灭民抿血氣恫圓明螟鸣铭名命谬摸 CBF8损笋藁椶咹缩琐索锁所塌他它她培
C4A6 摹磨模膜磨摩魔抹末莫墨默沫漠寞ccae 獭挞踢踏胎苔抬台泰酞太态汰坍掉
C486陌谋牟某拇牡亩妈母墓暮幕募慕木目CC86贪瘫滩坛植痰潭谭谈坦毯袒碳探叹发
C4Ce睦牧穆拿哪呐钠那娜纳氖乃奶耐奈南ccce汤塘搪堂棠膛唐糖诣躺淌趟烫掏海箱
C4D6男难囊挠脑恼闹掉呢馁内擨能妮霜倪CCD6绦菌桃选淘陶讨套特藤腾疼誊梯剔蹋
C4Ee泥尼拟你匿腻逆阔蔫拈年碾撵抢念娘CCEe锦提题蹄啼体替嚏惕涕刷屉天添填田
C4F6酸鸟尿捏聂孽啮镊镍涅您柠狞凝宁 ccre甜恬舔腆挑条迢眺跳贴铁帖厅听烃
C5A6 拧拧牛扭钮纽脓液农弄奴努怒女眠CDA6 打延停亭庭挺艇通桐酮瞳同铜形面
C5B6虐疟挪懦福诺哦欧鸥聚穗呕偶沤啪趴CDB6桶捅筒统痛偷投头透凸秃突图徒途
cscelle的伯琶拍排牌徘徊派攀潘盘磐盼畔coce居土吐兔湍团推频腿蜕褪退吞中臀折
cscelle的伯琶拍排牌徘洱派攀潘盘磐盼畔coce居土吐兔湍团推频腿蜕褪退吞屯臀拉cspe判叛兵庞旁耪胖抛咆刨炮袍跑泡呸胚cope托脱蛇陀驮驼椭妥拓唾挖哇蛙洼娃?
C5E8培裴赔陪配佩柿喷盆砰抨烹澎彭蓬棚CDE8抹歪外豌弯湾玩顽丸烷完碗挽晚皖附
csre硼隆膨期鹏捧碰坯砒露批拔劈琵毗 core宛婉万腕注王亡枉网往旺望忘妄威
C5F6硼隆膨期鹏捧碰坯础露批披劈琵毗 CDF6宛婉万腕汪王亡枉网往旺望忘妄威 C6A6 啤牌疲皮匹痞僻昆譬篇偏片骗飘漂CEA6 巍微危韦违桅围唯惟为潍维苇菱县
C6Be 飘票撇瞥拼频贫品聘乒坪苹萍平凭换CEBe 伟伪尾纬未蔚味畏胃喂槐位渭谓尉
C6Be飘票撇瞥拚频贫品聘乒坪苹萍平凭瓶CEBe伟伪尾纬未蔚味畏胃喂槐位渭谓尉愿C6Ce评屏坡泼颇婆破魄迫粕剖扑铺仆莆葡CECe卫瘟温蚊文闻纹吻稳紊问嗡翁瓮挝螈
Cade 菩蒲埔朴圃普浦遺曝瀑期欺栖威妻七CEDe涡窝我斡卧握沃巫鸣钨乌街还屋无势
C6D8 菩滿埔朴圃普浦谱曝爆期欺愐戚妻七CED8 渴窝我斡卧握沃巫鸣钨乌病还屋无列C6E8 凄漆靠沏其棋奇歧畦崎脐齐旗祈祁骑 CEE8 梧吾吴毋武五梧午舞伍侮坞戊零晤物
C6F8起岂乞企启契砌器气运弃汽泣讫掐 CEF8勿务悟误昔熙析西硒矽晰嘻吸锡牺
C6F8起岂乞企启契砌器气迄弃汽泣讫掐 CEF8勿务悟误昔熙析西硒矽晰嘻吸锡牺 C7A8 恰恰牵扦钎铅千迁签仟谦乾黔钱钳CFA8 稀息希悉膝夕借熄烯溪汐犀撒羹》
C788前潜遣线谴重嵌欠數枪呛腔羌墙蔷强CF88习媳喜铣洗系隙戏细瞎虾匣霞辖暇
crce抢橇锹敲悄桥瞧乔侨巧鞘撬翘峭俏窍crce侠狭下厦夏吓掀锨先仙鲜纤威贤衔朗
crce抢橇锹髚悄桥瞧乔侨巧鞘撬翘峭俏窍crce侠狭下厦夏吓掀锨先仙鲜纤咸贤犄货 crbe切茄且怯窃钦侵亲秦琴勤芹擒禽寝轮crbe闲涎弦嫌显险现献县腺馅羡宪陷限约
C7E6青轻氢倾侧清擎晴氰情顷请庆琼穷秋CFE6相厢镶香箱襄湘乡翔祥详想响享项表
C7F6丘邱球求因苗泅趋区蛆曲躯屈驱渠 CFF6橡像向象盖硝雷削哮置销消宵淆赔
Account

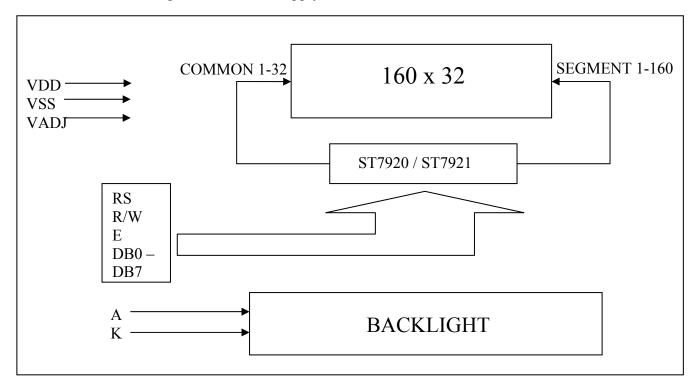
ST7920-0B-4/6-VC1.Z
0 1 2 3 4 5 6 7 8 9 A B C D E F 0 1 2 3 4 5 6 7 8 9 A B C D E F
D8A8   小孝校肖啸笑效  樊些歌蝎鞋协挟  拽D8A8
DOBO 那斜胁背写械卸壓懈泄泻谢屑新芯锌DOBO 匕毛夭爻卮氐囟胤馗毓奉鼗、亟鼎乜
D8C8  战辛新忻心信  萬星  惺惺  兴刑型形形 D8C8  机元半  李嗇  閼仄  厍層  屬  厥  屬  陽  四回
D9D9行醒幸杏性姓兄凶胸匈汹雄熊休修着D8D9匦腰匾赜卦卣 11刈刎刭刳刿剀剌剞剡
DOCO  柘嗅锈秀袖绣堀成需虛噓须徐许蓄勵 DOCO  剜劇  剽劂劇  劇劇  円智生任仇仂仁仡仏
DBF8  叙旭序  畜恤絮  媚绪  续轩喧宣  愚龅玄   DBF8  仞  似伢  低  代  他  位慢  长  使  伏  何
D1A8    选癣眩绚靴薛学穴雪血勋熏循甸询D9A8
D180寻驯巡殉汛训讯逊迅压押鸦鸭呀丫芽D980侔铸俨俪俅俚俣俜俑俟俸倩偌俳倬倏
D1C8 牙蚜崖衙涯雅哑亚讶焉咽阉烟淹盐严D9C8 倮倭懊倜倌倥倨傲偃偕偈偎偬偻傥傧
D1D8研蜒岩延言颜间炎沿奄掩眼衍演艳堰D9D8傩襟僖攸僭僬僦僮儇憺仝永佘佥俎龠
D1E8藤尺砚雁唁彦焰宴谚验殃央鸯秧杨扬D9E8余籴兮巽黉馘冁夔门匍訇匐凫夙兕亡
D1F8 伴病羊洋阳氧 仰痒养样漆遨腰妖瑶  D9F8 究毫衮表颞商裒禀嬴嬴嬴兰哲例诜
D2A8
D288野冶也页掖业叶奥腋夜液一壹医揖铱DAB8诎诒诓诔诖诘诙诜诟诠诤诨誗诮诰銋
DZC8依伊衣颐夷遗移仪胰疑沂宜姨彝椅蚁DAC8误诹诼诿谀埝谄谇谌谏谑谒谔谕谖谙
D2D8倚已乙矣以艺抑易邑屹忆役臆逸肄疫DAD8谛路谝谟谠谡谥谧谪遵谮谯谲献澹巅
D2E8  亦畜意穀忆义益隘  追议宜译异翼翌绎  DAE8
DZF8 茵荫因殷音明姻吟银淫寅饮尹引隐 DAF8 陴隈隍隗履邗邛邝邙邬邡郧邳邶邺
D3A8 印英樱婴鹰应缨莹莹萱荧蝇迎赢盈DBA8 即邰郏郅邾郐郯郇郓郦郢郜郄郛鄠
D380影频硬映剪拥拥腓浦庸雍踊蛹啉冰桶D880频郾鄄鄢鄞鄣鄱割鄹酃酆刍奂劢劬劭
D3C8永島勇用幽忧悠忧尤由邮铀犹油遊酉DBC8初部勐勖勰叟燮矍廴山凼鬯厶弁畚巯
D3D8有友右佑釉诱又幼进淤于盂榆虞愚舆DBD8堂垩堂整整壅壑圩圬圪圳扩圮圯坜圻 D3E8余俞逾鱼愉渝渔隅予娱雨与屿禹宇语DBE8频坩坳坫垆坼坻坨坭坶坳垭垤埛垲艇
D3E0余俞逾鱼愉渝渔隅予娱雨与屿禹宇语DBE0频坩圾坫垆坼坻坨坭坶坳垭垤垌垲埏
D3F8羽玉城芋郁吁遇喻峪御愈饮狱育誉 DBF8垧垴垓垠埕埘埚埙埒垸埴埯埸埤埝
D448   俗寓俗预赚取驾渊冤元垣袁原接辕DCA8   堋堍堤埭堀堞堙塄堠揭塬墁墉墚墀
D488四员圆猿源缘远苑愿忽院曰约越跃钥DC88響整整工艺芳兰字及五芎芑芗芙完芸
D4C8岳粤月悦阋耘云郧匀陨允运蕴酝晕韵DCC8萧芰荫苊苣芘芷芮苋苌苁苓芴芡芪芟
D108 孕血硬杂栽或灾害载再在咱攒暂赞赃DCD8 苄二扎苡苯甘基龙荔莧其英茴在荷苓
D4E8脏莽遭糟凿藻枣早澡蚤躁噪造皂灶燥DCE8革前前至茕茕苕茜黄荛荜茈菖茼茴茱
D4F8责各则浮贼怎增信曾赠扎喳渣札轧 DCF8莲养茯荏荇荃荟葡茗荠茭茺茳荦荥
DSAB 侧闸眨栅榨咋乍炸诈摘斋宅窄债寨DDAB 專茛荩荬荪荭葑莰茎莳莴莠莊莓夜 DSBB瞻毡詹粘迠蠡斩辗崭展蘸栈占战站进DDBB莅盖益莩荽莸荻幸莞茛莺莼蔶其菥菘
D580瞻毡詹粘沾盛斩辗崭展蘸栈占战站裡DD80莅杀壶莩荽簌荻莩莞莨莺菇膏萁菥瘛 B500′5′5′5′5′5′5′5′5′5′5′5′5′5′5′5′5′5′5
D5C8锭模章彰漳张堂张杖丈帐账仗胀瘴障DDC8堇萘萋菝菽菖萜页萑萆菔蔃菖萃菸疽 BED87800000000000000000000000000000000000
DSD8招昭技招赵照軍兆肇召遮折哲盟撤者DDD8看管范萦菰國契葑甚葙蒇蒇蒈葺箦惠 DSE8诸蔗这浙珍斟真甄砧臻贞针侦枕疹诊DDE8萼葆葩葶蒌蒎晝葭蓁蓍蓐蓦蒽蓓蓣蒿
DSEOI锗蔗这浙珍斟真甄砧臻贞针侦枕疹诊DDEOI萼葆疤葶蒌蒎萱葭蓁蓍蓐蓦蕙蓓蒻蒿 DSFOI震损镇阵蒸挣睁征狰争怔整拯正政 DDFOI蒺蓠蒡蒹蒴蒗蓥蓣蔌甍蔸蓰笯蔟蔺
D5F8]重揭镇阵蒸挣睁征狰争怔整拯正政 DDF8[褒蓄著蒹蒴蒗燮薇蔌甍蔸蓰笯蔟蔺 D6A8 帧症郑证芝枝支吱蜘知肢脂针之织DEA8 藻蔻蓿廖蕙草蕨蕤聶蕺膏蕃蕲蕻薤
DGAB 帧症郑证艺枝支吱蜘知肢脂汁之织DEAB 渠寇蓿麥萬草蕨蕤蕞蕺瞢蕃鲚蕻薤 DGBB职直植殖执值侄址指止趾只旨纸志挚DEBB薨薇薏蕹薮薜薅薹蠚薰蘚藁藜藿蘧蘅
D6C8 掷至致置帜峙制智轶稚质炙痔滯治室DEC8 繁菓蘼开弈亦仓耷奕奚类匏尢的尬膛
D6D8中 出思钟衷终种肿重仲众舟周州洲追DED8打 扣持抻拊拚拗拮挢拶挹捋捃掭揶捱
D6E8粥轴肘帚咒號宙星骤珠株蛛朱猪诸诛DEE8捺掎掴掉掬掊掋掮掼揲揸揠揿揄揞揎
D6F8逐竹烛煮柱嘱嘱主著柱助蛀贮铸筑 DEF8摒揆掾摅摁搋搛搠搌墛搡摞搡撂攒摭墩
D7AB 住注祝驻抓爪拽专砖转摆赚家桩庄DFAB 摺撷撸撙撺擀摄摒擤擢攉攥攥弋忒
D788 装妆撞壮状桩锥追赘坠缀谆准捉拙卓DF88 甙減卟叱叽叩叨叻吒吖吆呋呒呓呔呖
D7C8桌琢茁酌啄着灼独兹咨资姿滋溜孜紫DFC8呃吡呗呙吣吲喱咔呷呱呤咚咛咄呶呦
D7D8仔籽滓子自渍字鬃棕踪宗综总纵邹走DFD8咝哐咭晒咴哒咧咦哓哔呲咣哕咻咿哌
D7E8奏奏租足卒族祖诅阻组钻纂嘴醉最罪DFE8哙哚哜咩咪咤嚓哏哞唛哧唠哽唔哳唢
D7F81專遵昨左佐柞做作坐座 DFF81皂嘴唑唧嗪啧喏喵啉嗷啁喝唿啐唼
No N. 4. 100 N. 14. 14. 14. 14. 14. 14. 14. 14. 14. 14

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ST7920-0B-5/6-VC1.2 0 1 2 3 4 5 6 7 8 9 A B C D E F  0 1 2 3 4 5 6 7 8 9 A B C D E F
E8A8 唷啖呦啶嘟呋喇礀喋嗒喃喱喹喈喁E8A8 琛琚瑁瑜瑷瑕瑙瑷瑭瑾璜璎璀璁璇
E886喟啾嗖喑啻嗟喽喾喔喙嗪嗷嗉峫嗑嗫E886璋璞璨珕躃璧瑞璺鶗韫韬杌扚杞权杩
EBCB嗬嗔嚅嗝嗄嗯嗥嗲嗳嗌嗍嗨嗵嗤辔嘞EBCB枥枇杪杏枘枧杵枨枞梟枋柶桪柰栉柘
EBDB嘈檃嘁嘤嘣嗾嘀嘧嘭噘嚓噗嘬噍噢啥EBDB拢枢杆栌柙枵粬枳柝栀枔楋柢栎柁柽
▐886●噌噔嚆噤噱噫噻囎嘿嚓嚯嚵□囝囡8866栲栳杻桡桎桢桄桤梃栝桕榉桁桧桀栾
EBFB图囫囫囵圄圊園園輔帙帧帑帱帻崓 EBFB菜桉栩芫桔桴桷梓柪棂槠棼椟椠婥
E1A6 帷幄幔嶂幞幡岌屺岍岐岖岈岘岙岑E9A6 椤棰椋楟楗樕椐楱椹楠楂楝榄楫榀
E188岚岜岵岢岽岬岫岱峋峁岷峄峒峤峋峥E988榘椽榝槌榇榈槎榉楦楣楹榛榧榻榫榭
E1C6崂崃崧崦崮崤崞崆崛蝾巊嵗崽嵬嵛嵯E9C6槔榱槗靱槟榟槠榍槿樯槭樗槿橥槲橄
E1D0嵝峨嵋嵊嵩嵴嶂嶙嶝豳嶷蘍彳彷徂徇E9D0樾檠橐橛櫵檎橹欂榥橘橼檑檐檩糪檫
E1E6佯後往往往往往微微衡》了3九升扩码E9E6猷獒殁殂殇殄殒殓殍殚殛殡殪轫轭轱
E1F6  汨阭狎絅視狨얁狩翙狴狷猁狳脸狺   E9F6  轲射轵轸蜉穌轺拭轾翰鞀辄荎辋
EZAM 發清理罗兜豬淬歘溯猹腲渭猸瑈獐EAAM 辍辎辏辘辏軎戋戗戛戟戢戡戥戥戬 EZBM技擫猿攤爑獾妕繋熘偒夂饣饧饨饩饪EABM或颐领瓿甏甑甓攴旮旯旰旲昙杲昃盺
E2Be 造廠液鋼燻獾桝繋角备欠化協体汽饪EABe 威陶领额甏甑甓支旮旯旰旲昙杲昃昕
EZCE沃防饴饷饽馀馄馇馊馍馐馑馓馔馕庀EACE的炅曷昝昴昱昶昵耆晟晔晁晏晖晡晗
E2D8 庑庋庖麻庠庹庵庾庳康廞廑廛廨廪膺EAD8 晷暄睽暧暝皦曛曜曦曩贲贳贶贻贽赀
E2E81 切付任凭技怄仲忤忾怅怆忪忭忸怙EAE8赅赆赈赉赇赉赕赙觇觊觋觌觎觏觐觑
E2F6怵怦怛快作怩怫怊怿怡恸恹恻恺恂 EAF6牮犟牝牦牯牾艁犄犋揵掮犒挈挲掰
E3A8 格恽悖悚悭悝悃悒怫悛腰岸悱惝惘E8A8 翔擘耄毪毳毽毵毹氅氇氆氍氕氘氙
E3B6個炮停溫愦愕愣愦愀愎愫賺慵慢憔憧EBB6氚氢氫氤氪氲攵敕敖牍牒牖爰臹刖肟
E3Ce 萨檀懵泰隳门闫闹闳闵闶闼阊阊阄阆EBCe 肜肓肼朊肽肱肫肭肴肷胧胨胩胪胛胂
E3De國月風層圖與奧奧圖園國國之力狀紀EBDe實施無診腹脈眨胱膈咽瞼凝肪胼趺脒
ESEO 汔汜汊沣沅沐沔沌汨汩汴汶沆沩泐泔EBEO 豚脶脞肸脘腒腊腌雕膄腙腚腱腠脯腯
E3F6 术
E4A6 酒精例決演洇洄洙泪洫浍洮洵洚浏ECA6 雕雕镹歡欹歒歆鷻飕飒飓飕飙飚殳
E480 件浸物練浯淶涠捉涓涔浜鯑浼浣渚娸EC80 毂载觳斐齑斓於旆旄旃旌旎旒旖炀炜
E4Ce淅凇读诼淠渑淦淝淙渖涫渌涮渫쩰愐ECCe炖炝炻烀炷怰炱烨焆焐焓焖焯焱燘煜
E4De湫溲徨溆湓湔渲媢湄湐溱溘滠漭滢禣ECDe煨煅煲煊煸煺熘熳焴麨熠燠燔燧輘爝
E4E6溧溽榻楹笔溴滏塘湾塓潢潆潇漤槽缐ECE6粟灬焘煦夏庚戽扃扈扉礻祀祆祉祛枯 PAR6废碘繎滐滐渀灹濥対ケ娺嵡燽涙膥,para 经光边短短波处知湖海洋海湾下上
E4F6溟溾潋锵漪澭爀勴澍燍煯潲澅潺鯯 ECF6袚秨苶袛祠祯狣褀褝褉禚橲襽忢忐
E586 維禮禮禮孫福濮得禄濯瀚濯嬴瀹漢ED66 总规志思恁恙恣忌愆愍慝憩憝懋憑 E586颢彌宁亢宕宓审宸甯骞搴寤寮褰寰蹇ED86懿中丰沓泶淼矶矸硺宭砗砘砑斫砭砜
ESBO 频端广先宕密有底窗要塞寤聚要寰臺EDBO 题中丰沓泶淼矶矸砀君砫砘砑斫瓩砜
ESC8套让迓迕迥迮迤迩迦迳迨逅湰逋逦逑EDC8砝砹砺砻砟砼砥砬砣砩稝硭硖硗訾秱 ESD8湞逖逡嘡逶逭逯湍遑莤遐滶溝溻瀊湦EDD8硵硌硪碛碓碚碇碐碡碣碲碹鳾磔磣磉
ESDO追述这重委這還還這遭遭激盡過溫星EDDO的格研碼確確確確確確確確確確確確確 ESEO透滤遊遊速還回彗象最用思展屑屏羅EDEO學碟墩證確聽碟蓮島常戲補肝眄眍盹
ESFO 展展空智引能邓繁中的妃妍妩妪妣 EDFO 吵耽告智眙眭毗哆眸睐脸睇睃睚睍
E6A6 於姊妫妞好姒妲妯姍妾娅娆姝窭姣EEA6 睢睥睿瞍睽瞀睻瞑瞟瞠瞰瞬瞽盯畀
E6Ber 奸烷埋烤蜗州炙绨娓婀婧续婕娼婢蝉EEBer 联 政 取 昣 會
E6Beyfic埋娉蜗州娑娣娓婀婧埭婕娼婢蝉EEBetto的昣畲畹疃罘罡罟詈罨罴罱罹羁 E6Ce贸媪媛婷婺媾嫫嫓皧嫔嬂嫠惼嫱嫖嫦EECe罾盍盥蠲钅钆钇钋钊钉钍钏钐钔钗钕
EGDE 爆燒塘嬗嫛嬲嬤嫞尕尜孚摮孶孑孓孢EEDE 钚钛钜钡钤钫钪钭钒钯钰钲钴钶钷钸
EGDe嫁婚嬉嬉螳嬲嬷嫞尕尜穻孧葽孑孓孢EEDe钚钛钜钡钤钫钪铒钛钯钰钲钴钶钷钸 EGEe驵驷驸驺驿鹙鮯骁骅骈骊骐骒骓骖骘EEEe鋑戫钼钽钿綔铈铉铊铋铌铍铎鴮硓铒
E6F8李  整  空鳴  空鳴  雪  紅紅紅紅     EEF8  街舖  快翻  街锅  街锅  铁翻
IE7A8 医翻铅绀蜡蚴绉缃绌蛤缦绗烾鮿绱EFA8 锰锹接铯锍励按铆铹铼铽铟锃镧锆
IE780绨绫錡鉗绱鍻缍绶绺缣绾鯔缂缃鍉膷EF80饿锉锊锍锎餇锒愦锔餇锔锖锛锛锝锞银
E7Ce绩緦嬹婽缒缗缙搷缛鎬縭搤貄缤嫖蟃EFCe铟锪锫锩锬锱懊锴锶锷锸锼锾锿锬锵
E7Ce绩總擴娛缒缗缙填縟鎬縭搤栠缤缥墁EFCe铟锪锫锩锬锱懊锴锶锷锸锼锾锿餤锵 E7De缥鏐鏁鶳貁鏳鑩鑓嬠鐛鐖庅鸓巛畄邕EFDe镌镅镆搹鎸傽镏镒镓镔镖镗镘镙豄篏
E7Ee 玎玑玮玢玟珏珂珑玷玳珀珉珈珥珙顼EFEe 镟销谭额镁镥镦镧觷镩檛跾镬镯镱擦
E7E8 玎玑玮玢玟珏珂珑玷玳珀珉珈珥珙顼EFE8镟销墰镢镤镥镦镧镥镩檛甇镬镯豄镲 E7F8琊珩珧珞玺珲琏琪瑛琦琥琨琰琮琬 EFF8皫锤矧矬雉舭秼秼秼稆嵇粰稂穓稔

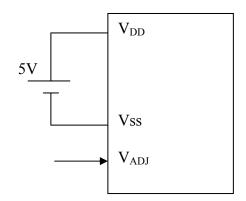


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Fede 鹦											- Y	狟		麺	HACK!
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F 1 B 0 廳	癖	癫	癯	翊	娻	穸	穹	寉	窆	窈	宨	窦	棄	窬	窨
F100 霎	寙	衤	视	衲	柱	衿	袂			祫	袼	裉	裢	裎	裣
F1D0神	裱	禇	裼	捙	裾	腏	褡	褙	椺	褛	褊	褴	褫	褶	襁
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F1F0構						聆		聐							
FZAØ	颉	颔				颚									虔
F2B0則														蛏	
FZCe														邨	帲
F2D09#															
F2E0 蜞															
F2F0幅															-13
F3A0						螃							媷		蜟
F3B6蟒														缶	
F3Ce壁	噩	証	峚	翚	爱	蛋	至	帮	蕉	萦	荔	蕹	죰	瞢	
F3DeF管				宏	筘	迓	蒥	鞀	笙			錖	筝		
F3E0事		膂				箧		簭	箝	掻	箳	鞷		羞	
F3F0意	蔞	葟	辳	蚕		葉		隓		麓	蔥			蓠	21.1
F4A0		簪		鎕		繭		算	萎	歶	复	面	-	薍	ŖΥ
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F4F0 3	誀	蒩	罰						<del>-</del>	詽	畜	葥	=		20
F5A0						酢									西基
F5B0脑	翻	嚴	髭	龘	鼹	誠	뺊	薛	洯	跷	囂	蹵	鞮	薆	露
F5Ce的		骷	酰	霝	諾	爵	崩	篮	記	訲	謆		餖		皹
F5De跌			髅	韻	멾			踟			詮		豍		
F5E0 DE		艡	譣	艡	野	証	饠	庭	證	謚	썷	쐝	鏇	諁	繭
F5F0 E		露	盪	뾏	#75 377	韜	新	霜	麵	数	益	提	觚	嚣	PH 5
F6A0	嚣	麉	籲	100 100 100	趧		盂	鉴	罂	똧	玺	鸒	業	霊	霪
F6B0 霭	霊	雍	띖		_	嚣	뒚	胡	益	鼯	鍉	鼍	鼍	鼉	養
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FEDE的	-			盂	跃	6/4	墨	곮		器	蓋	픒	甇	謎跡	_
F6E0鲜								塑							
F6F6算		盟	器	뜶	띪	<u>餘</u> 鯔	器語	튪	쁣	쁿	馥	整建	黝鳊		≅pŁ
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F7A0 F7B0 <u>朝</u>										爵	艷	點點		囂	
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	縏	髀	髅突	鹘	鰕	酆	閱	魅	쎯	愚	胍	쎯	쩵	삃	篡
F7D0 麿	基度	蕞	幕	整	<b>五</b>	뺥	틆	퓲	橐	鸓	鼓	鑫	鬏ᄥ	髮奶	靐
F7E0 驚 F2F0 堅	麗	鷹	쎯	麙	器	鏖	凞	麒師		薪品	鸜	蕪	뾆	썲	黠
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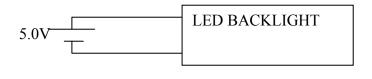
### 11. Block Diagram and Power Supply



## **Block Diagram**



Where  $V_{DD}$ - $V_{ADJ}$  = LCD Driving voltage



Power Supply

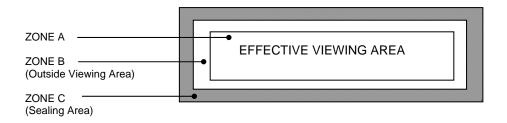
## CRYSTAL CLEAR TECHNOLOGY SDN. BHD.





## 12.0 Quality Assurance

#### 12.1 ZONE DEFINITION



## 12.1.1 Black Spot, White Spot and Foreign Material

Defect Category	Defect Description	Crite	Drawing Specification			
Black Spot,	Black Spot, White					
White Spot	Spot and Foreign	Zone /	Acceptable No.			
and Foreign Material	Material	Dimension	A	В	C	B
Material		D <u>&lt; </u> 0.10mm	NC	NC	NC	A
		0.10 <d 0.20mm<="" td="" ≤=""><td>3</td><td>3</td><td>NC</td><td>D = (A + B)/2</td></d>	3	3	NC	D = (A + B)/2
		0.20 < D \le 0.30mm	1	2	NC	- (,-
		D > 0.30 mm	0	0	NC	
		NC: No count				
		D: Mean Diameter of				

## 12.1.2 Line Shape and Scratches

Defect Category	Defect Description		Criteri	Drawing Specification			
Line shape	Line shape and						
and scratches	scratches	Zone /Dir	nension	Acc	Acceptable No.		
		X	Y	Α	В	C	
		-	<0.01mm	NC	NC	NC	
		< 2 mm	< 0.02mm	1	1	NC	
		<1 mm	< 0.0 2mm	1	2	NC	

#### 12.1.3 Pin Hole

Defect Category	Defect Description	Criterion	Drawing Specification
Pin Hole	Pin hole / void at light up segment	$D \le 0.20$ mm within 1 part/segment	D = (A + B)/2



## 12.1.4 Polarizer Bubble/Foreign Material

Defect Category	Defect Description	Crite	Drawing Specification			
	Polarizer bubble / Foreign material	Zone /				
	1 oreign material	Dimension	A	eptable l	C	B
		D < 0.15mm	NC	NC	NC	Δ
		$0.15 < D \le 0.30$ mm	3	5	NC	- · · · · · · · · · · · · · · · · · · ·
		$0.30 < D \le 0.50$ mm	2	3	NC	D = (A + B)/2
		$0.50 < D \le 1.0 \text{mm}$ 0 1 NC		NC		
		NC: No count				
		D: Mean Diameter of Defect				

Note: Total defects shall not exceed five

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#### 13. Precaution for using LCM

#### 1. Liquid Crystal Display (LCD)

LCD is made up of glass, organic sealant, organic fluid and polymer based polarizers. The following precautions should be taken when handling.

- b) Keep the temperature within the range of use and storage. Excessive temperature and humidity could cause polarization degredation, polarizer peel off or bubble.
- c) Do not contact the exposed polarizer with anything harder than HB pencil lead. To clean dust off the display surface, wipe gently with cotton, chamois or other soft material soaked in petroleum benzin.
- d) Wipe off saliva or water drops immediately. Contact with water over a long period of time may cause polarizer deformation or colour fading, while an active LCD with water condensation on its surface will cause corrosion of ITO electrodes.
- e) Glass can be easily chipped or cracked from rough handling, especially at corners and edges.
- f) Do not drive LCD with DC voltage.

#### 2. Liquid Crystal Display Modules.

#### 2.1 Mechanical Considerations

LCM are assembled and adjusted with a high degree of precision. Avoid excessive shocks and do not make any alterations or modification. The following should be noted.

- a) Do not tamper in any way with the tabs on the metal frame.
- b) Do not modify the PCB by drilling extra holes, changing its outline, moving its component or modifying its pattern.
- Do not touch the elastomer connector, especially insert a backlight panel (for example, EL)
- d) When mounting a LCM make sure that the PCB is not under any stress such as bending or twisting. Elastomer contacts are very delicate and missing pixels could result from slight dislocation of any of the elements.

 a) Avoid pressing on the metal bezel, otherwise the elastomer connector could be deformed and lose contact, resulting in missing pixels.

#### 2.2 Static Electricity

LCM contains CMOS LSI's and the same precaution for such devices should apply, namely

- a) The operator should be grounded whenever he/she comes into contact with the module. Never touch any of the conductive parts such as the LSI pads, the copper leads on the PCB and the interface terminals with any parts of the human body.
- b) The modules should be kept in antistatic bags or other containers to static for storage.
- Only properly grounded soldering irons should be used.
- d) If an electric screwdriver is used, it should be well grounded and shielded from commutator spark.
- e) The normal static prevention measures should be observed for work clothes and working benches, the latter conductive (rubber) mat is recommended.
- f) Since dry air is inductive to statics, a relative humidity of 50-60% is recommended.

#### 2.3 Soldering

- a) Solder only to the I/O terminals.
- Use only soldering irons with proper grounding and no leakage.
- c) Soldering temperature: 280 °C
- d) Soldering time: 3 to 4 sec
- e) Use eutectic solder with resin flux fill.
- f) If flux is used, the LCD surface should be covered to avoid flux spatters. Flux residue should be removed afterwards.

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#### 2.4 Operation

- The contras can be adjusted by varying the LCD driving voltage V0
- b) Driving voltage should be kept within specified range, excess voltage shortens display life.
- Response time increases with decrease in temperature.
- d) Display may turn black or dark blue at temperature above its operational range, this is (however not pressing on the viewing area) may cause the segments to appear "fractured".
- Mechanical disturbance during operation ( such as pressing on the viewing area) may cause the segments to appear "fractured".

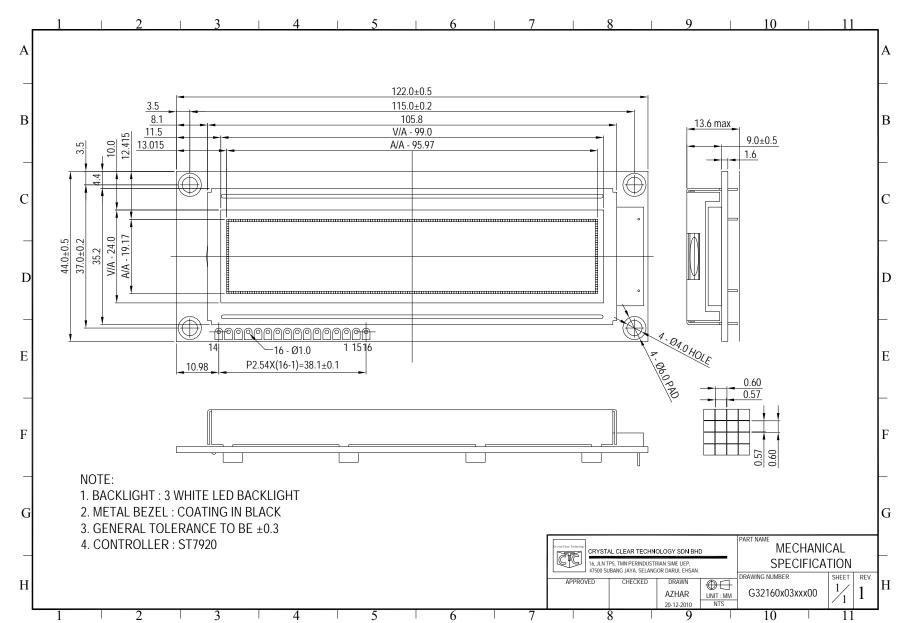
#### 2.5 Storage

If any fluid leaks out of the damage glass cell, wash off any human part that comes into contact with soap and water. Never swallow the fluid. The toxicity is extremely low but caution should be exercised at all the time.

#### 2.6 Limited Warranty

Unless otherwise agreed between Crystal Clear Technology and customer, Crystal Clear Technology will replace or repair any of its LCD and LCM which is found to be defective electrically and visually when inspected in accordance with Crystal Clear Technology acceptance standards, for a period of one year from date of shipment. Confirmation of such date shall be based on freight documents. The warranty liability of Crystal Clear Technology is limited to repair and/or replacement on the terms set forth above. Crystal Clear Technology will not responsible for any subsequent or consequential events.







## **Crystal Clear Technology**

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