













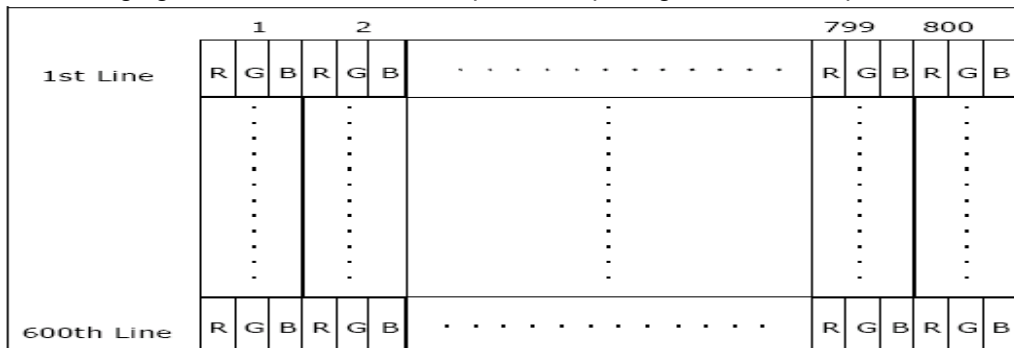


### 7.3 Color Data Input Assignment

		Data Signal																	
		Red						Green				Blue							
Color		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale of Red	Red(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	Red(61)	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale of Green	Green(0)/ Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	Green(61)	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0
	Green(62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	Green(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Gray Scale of Blue	Blue(0)/ Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue (1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue (2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	Blue (61)	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	1
	Blue (62)	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0
	Blue (63)	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1

### 7.4 Pixel Format Image

Following figure shows the relationship of the input signals and LCD pixel format :





## 8. PIN CONNECTIONS

### 8.1 Input Pins Function

Pin	Name	Description	Remark
1	VCC	Power Supply	
2	VCC	Power Supply	
3	GND	Ground	
4	GND	Ground	
5	RXIN0-	Differential Data Input, CH0 (Negative )	R0 ~ R5, G0
6	RXIN0+	Differential Data Input, CH0 ( Positive )	
7	GND	Ground	
8	RXIN 1-	Differential Data Input, CH1 ( Negative )	G1 ~ G5, B0, B1
9	RXIN 1+	Differential Data Input , CH1 ( Positive )	
10	GND	Ground	
11	RXIN 2-	Differential Data Input , CH2 ( Negative )	B2 ~ B5, NC, NC,DE
12	RXIN 2+	Differential Data Input , CH2 ( Positive )	
13	GND	Ground	
14	CKIN-	Differential Clock Input ( Negative )	DCLK
15	CKIN+	Differential Clock Input ( Positive )	
16	GND	Ground	
17	A	Power for LED backlight anode	
18	K	Power for LED backlight cathode	
19	GND	Ground	
20	GND	Ground	

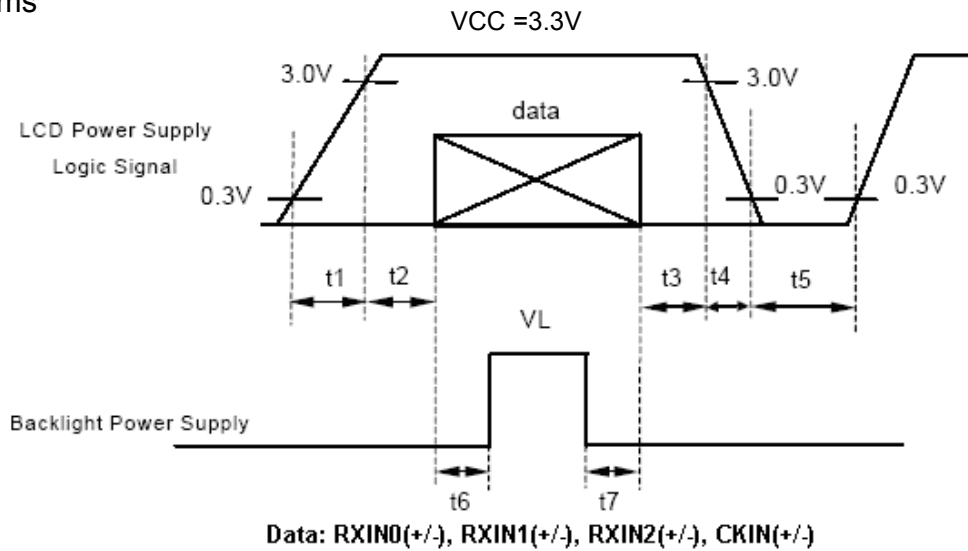
## 8.2 Power Signal Sequence

$t1 \leq 10\text{ms}$  :  $1 \text{ sec} \leq t5$

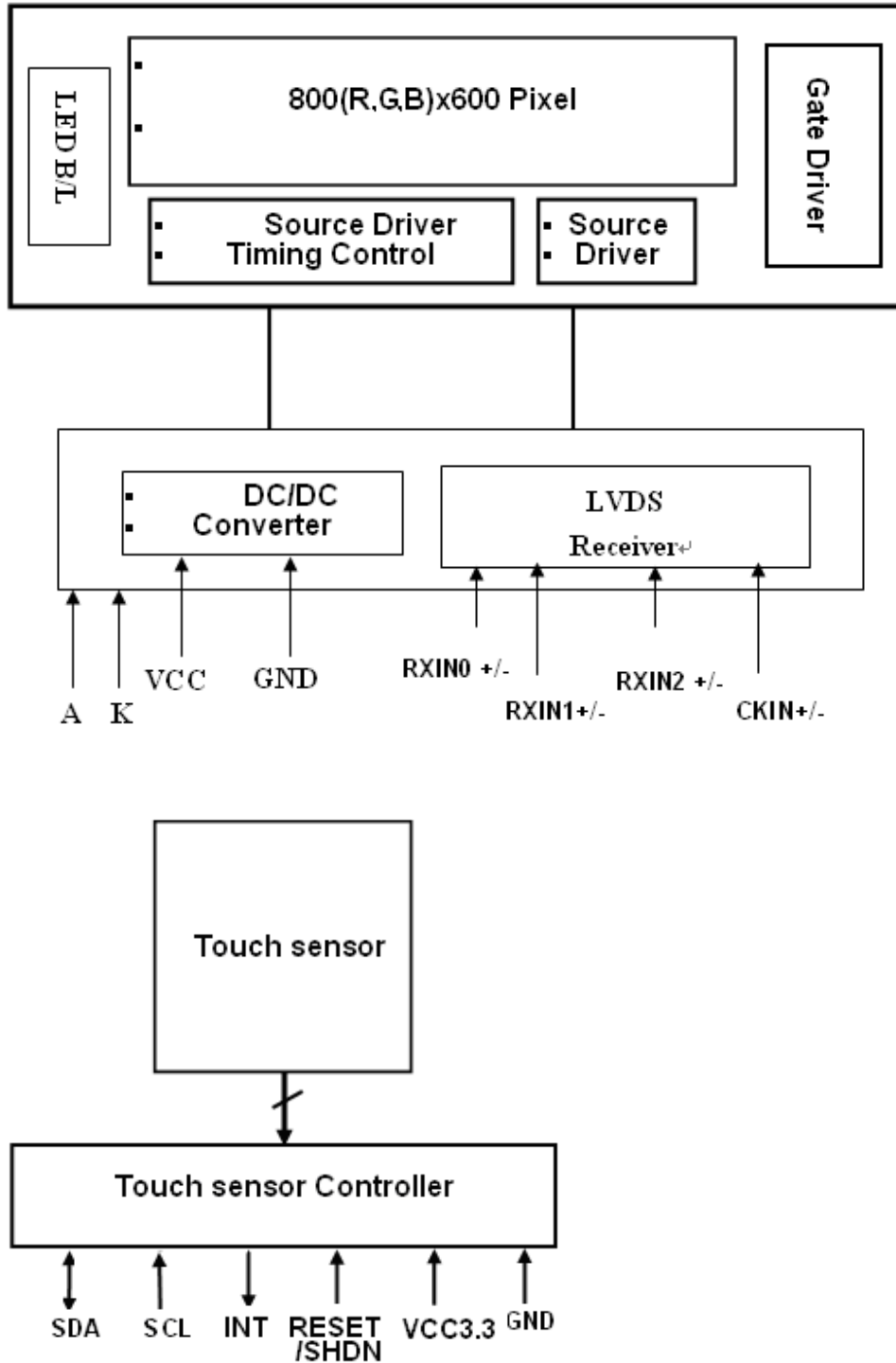
$50\text{ms} \leq t2$  :  $200\text{ms} \leq t6$

$0 < t3 \leq 50\text{ms}$ :  $200\text{ms} \leq t7$

$0 < t4 \leq 10\text{ms}$



## 9. BLOCK DIAGRAM

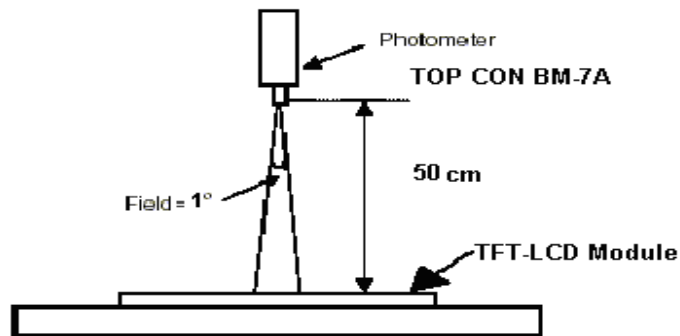


### 10. OPTICAL CHARACTERISTIC

Parameter	Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remarks	
Viewing Angle	Horizontal	$\theta_{x+}$	60	70	--	deg	Note 1,4	
		$\theta_{x-}$	60	70	--			
	Vertical	$\theta_{y+}$	CR $\geq$ 10	40	50			--
		$\theta_{y-}$		60	70			--
Contrast Ratio	CR max.	Center	400	500	--		Note 1,3	
Response time	Rise	Tr	--	10	20	ms	Note 1,6	
	Fall	Tf	$\theta_x=\theta_y=0^\circ$	--	15	30		ms
Brightness Uniformity	B-uni	$\theta_x=\theta_y=0^\circ$	70	75	--	%	Note1,5	
Central Luminance	L	$I_L=180mA$	170	210	--	cd/m <sup>2</sup>	Note 1,2	
White Chromaticity	$x_w$	Center	0.26	0.31	0.36		Note 1,2	
	$y_w$	$\theta_x=\theta_y=0^\circ$	0.28	0.33	0.38			
Image sticking	tis	2 hours	--	--	2	Sec	Note 7	

The following optical specifications shall be measured in a darkroom or equivalent state (ambient luminance  $\leq 1$  lux, and at room temperature). The operation temperature is  $25^\circ C \pm 2^\circ C$ , and LED current  $I_L=180mA$ . The measurement method is shown in Note1.

Note1: The method of optical measurement:

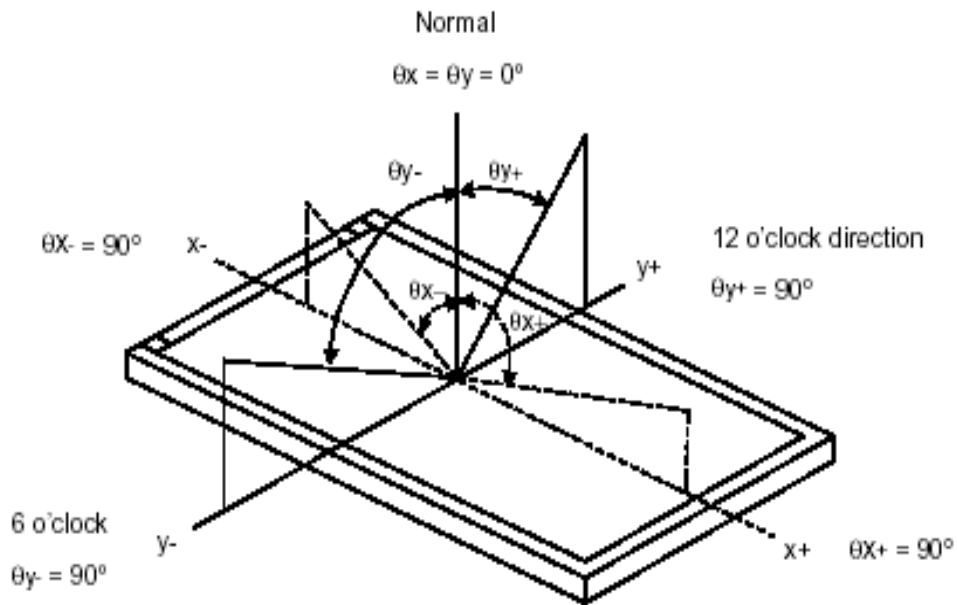


Note2: Measured at the central point of the LCD module and at the viewing angle of the  $\theta_x=\theta_y=0^\circ$

Note3: Definition of Contrast Ratio (CR):

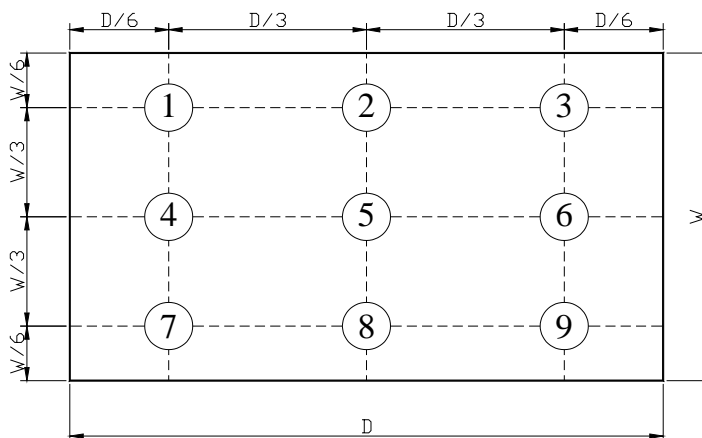
$$CR = \frac{\text{Luminance with all pixels in white state}}{\text{Luminance with all pixels in Black state}}$$

Note 4: Definition of Viewing Angle(CR≥10):



Note 5: Definition of Brightness Uniformity (B-uni):

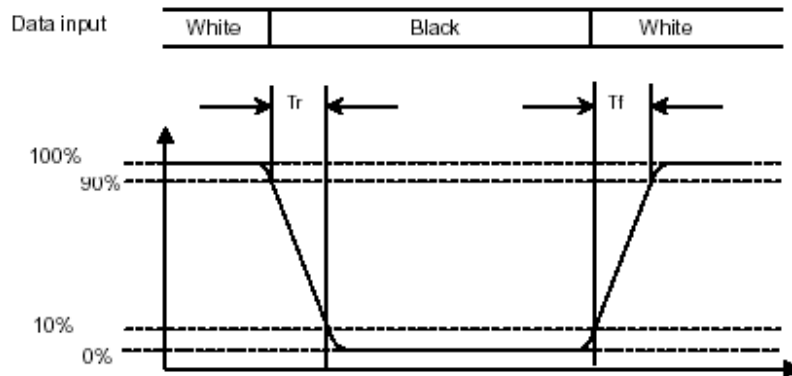
### Luminance Measuring Points



$$B\text{-uni} = \frac{\text{Minimum luminance of 9 points}}{\text{Maximum luminance of 9 points}}$$

Note6: Definition of Response Time:

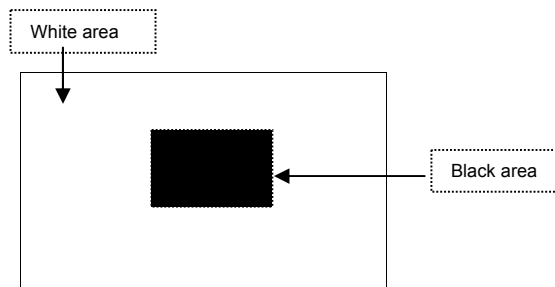
The Response Time is set initially by defining the “Rising Time (Tr)” and the “Falling Time (Tf)” respectively. Tr and Tf are defined as following figure.



Note 7: Definition of Image sticking (tis):

Continuously display the test pattern shown in the figure below for 2 hours. Then display a completely white screen. The previous image shall not persist more than 2 sec at 25 °C

**Image sticking pattern**



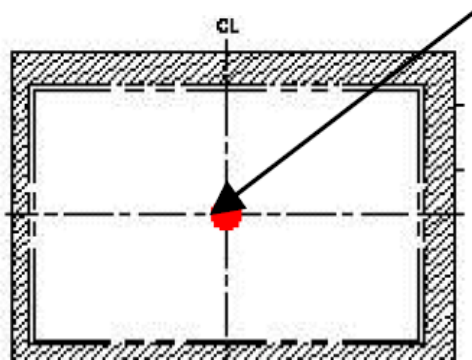
## 11. CTP GENERAL SPECIFICATIONS

### 11.1 CTP main feature

Item	Specification	Unit
Type	Transparent type projected capacitive touch panel	
Input mode	Human's finger	
Finger	10	
Transparency	85%	%
Haze	5.0%	%
Hardness	7H (typ.) [by JIS K5400]	Pencil hardness
Report rate	200(Max)	Points/sec
Response time	11(Max)	ms
Point hitting life time	1,000,000 times min.	Note 1

Note 1: Use 8 mm diameter silicon rubber/force 3N to knock on the same point twice per second (no-operating), after test function check pass.

central point



### 11.2 CTP Absolute Maximum Rating

Symbol	Description	Min	Typ.	Max	Unit	Notes
VCC3.3	Supply voltage	-0.3	-	+5.5	V	
VIO	DC input voltage	-0.3	-	VCC3.3+0.3	V	

### 11.3 CTP Electrical Characteristic

Symbol	Description	Min	Typ.	Max	Unit	Notes
VCC3.3	Power Supply voltage	2.7	3.3	5.5	V	
GND	Power Ground	-0.3	-	-	V	
I <sub>normal</sub>	Normal operation mode	-	30	-	mA	At VCC3.3=3.3V
I <sub>sleep</sub>	Sleep Mode	-	15	-	uA	
V <sub>IH</sub>	Input H voltage	0.4VCC3.3	-	VCC3.3+0.5	V	
V <sub>IL</sub>	Input L voltage	-0.3	-	0.2VCC3.3	V	

### 11.4 CTP Pin Connections

No.	Name	I/O	Description
1	VCC3.3	P	Power; VCC3.3=3.3V(typ.)
2	SCL	I	Clock; 100KHz
3	SDA	I/O	Serial data access
4	INT	O	Active low when data output from touch panel
5	RESET/SHDN	I	Reset
6	GND	P	Ground

### 11.5 Timing Characteristic

The address of GT827's slave device is 0xBA/0xBB. When master CPU addressing GT827, it will send read and write control bits simultaneously where are appended to slave device ("0"-write; "1"- read) for composing a byte with device address. i.e.: 0xBA – conduct write operation to GT827; 0xBB – conduct read operation to GT827.

#### 11.5.1 Postfix Communication:

Only after receiving postfix signal (under the condition of no external signal), can GT827 update coordinate in buffer in real time. After completing communication, I2C needs to send extra postfix signal. But if a series of communication appear, the postfix signal should be sent after the last one finished (except the coordinate reading process, the postfix signal could be sent after finishing reading a frame, so as to prevent output buffer to be changed by GT827 during the read process of master device). Below is the communication format of postfix: Use write process to search register addressing (0x8000), and send stop signal.

#### 11.5.2 Data Transmission:

The communication usually is launched by master CPU. When SCL keeps "1" SDA manages the change from "1" to "0". Then the address information or data stream begins to transmit after start signal.

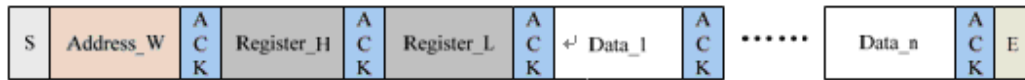
Any slave device connected with I2C circuit needs to check 8 bits address information after circuit launches start signal and respond correctly. After receiving the matching address information, GT827 will update SDA as an output and set the value as "0" for answering signal in the ninth clock cycle. The GT827 will lay idle if matching address information is unavailable (neither 0xBA nor 0xBB).

The SDA port sends the data with 9 bits serial data according to nine clock cycles. The 8 valid data + 1 receiver send ACK (acknowledgement signal) or NACK (negative acknowledgement signal). It is valid when SCL is "1" during the data transmission.

The main CPU sends stop signal after transmission where SDA manages the change from "0" to "1" when SCL stays "1".



### 11.5.3 Write operations to I<sup>2</sup>C slave



#### Write operations

Above is the flow chart of master CPU conducting write process for GT827. Master CPU launches a start signal and sends address, write and read information (“0” means write process -- 0XBA).

After receiving response, master CPU sends 16 bits address of register and writes 8 bits into register

The address pointer of GT827’s register will automatically increase 1 in write process. So it can continuously write continuation register address at a time. If write process is done, master CPU sends stop signal.

### 11.5.4 Read operations to I<sup>2</sup>C slave



#### Read operation

Above is the flow chart of master CPU conducting read process for GT827. Master CPU launches a start signal and sends address, write and read information (“0” means read process -- 0XBA).

Once receives acknowledgement signal, master CPU sends 16 bits register address information and sets the read-demanding register address. Then master CPU resends a start signal for read process (0XBB). It begins to read data until receiving acknowledge.

Likewise, GT827 can conduct continuation read process. Master CPU will correspondingly send an acknowledgement signal to indicate successful byte reception. And CPU will send “NACK” once receiving the last byte to stop transmission.

## 11.6 Register information

Addr	R/W	Name	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
0XF40	R	Touch Flags	Buffer Status		L_touch	P4	P3	P2	P1	P0
0XF41	R	Touch key	Reserved				Key4	Key3	Key2	Key1
0XF42	R	Point0	Point0 X H							
0XF43	R		Point0 X L							
0XF44	R		Point0 Y H							
0XF45	R		Point0 Y L							
0XF46	R	Point1	Point0 Size							
0XF47	R		Point1 X H							
0XF48	R		Point1 X L							
0XF49	R		Point1 Y H							
0XF4A	R		Point1 Y L							
0XF4B	R		Point1 Size							
0XF4C	R	Point2	Point2 X H							
0XF4D	R		Point2 X L							
0XF4E	R		Point2 Y H							

0XF4F	R		Point2 Y L
0XF50	R		Point2 Size
0XF51	R	Point3	Point3 X H
0XF52	R		Point3 X L
0XF53	R		Point3 Y H
0XF54	R		Point3 Y L
0XF55	R		Point3 Size
0XF56	R		Point4
0XF57	R	Point4 X L	
0XF58	R	Point4 Y H	
0XF59	R	Point4 Y L	
0XF5A	R	Point4 Size	
0XF5B	R	Coor checksum	Coordinate checksum
0XF5C~ 0XF7C	-	NC	Reserved
0xF7D	R	PID	Product ID(hex)
0xF7E	R	VID_H	Product version High byte(hex)
0xF7F	R	VID_L	Product version low byte(hex)
0xF80	R/W	DriverCH0	Screen 1 drives corresponding IC drive line
0xF81	R/W	DriverCH1	Screen 2 drives corresponding IC drive line
0xF82	R/W	DriverCH2	Screen 3 drives corresponding IC drive line
0xF83	R/W	DriverCH3	Screen 4 drives corresponding IC drive line
0xF84	R/W	DriverCH4	Screen 5 drives corresponding IC drive line
0xF85	R/W	DriverCH5	Screen 6 drives corresponding IC drive line
0xF86	R/W	DriverCH6	Screen 7 drives corresponding IC drive line
0xF87	R/W	DriverCH7	Screen 8 drives corresponding IC drive line
0xF88	R/W	DriverCH8	Screen 9 drives corresponding IC drive line
0xF89	R/W	DriverCH9	Screen 10 drives corresponding IC drive line
0xF8A	R/W	DriverCH10	Screen 11 drives corresponding IC drive line
0xF8B	R/W	DriverCH11	Screen 12 drives corresponding IC drive line
0xF8C	R/W	DriverCH12	Screen 13 drives corresponding IC drive line
0xF8D	R/W	DriverCH13	Screen 14 drives corresponding IC drive line
0xF8E	R/W	DriverCH14	Screen 15 drives corresponding IC drive line
0xF8F	R/W	DriverCH15	Screen 16 drives corresponding IC drive line
0xF90	R/W	DriverCH16	Screen 17 drives corresponding IC drive line
0xF91	R/W	DriverCH17	Screen 18 drives corresponding IC drive line
0xF92	R/W	DriverCH18	Screen 19 drives corresponding IC drive line
0xF93	R/W	DriverCH19	Screen 20 drives corresponding IC drive line
0xF94	R/W	DriverCH20	Screen 21 drives corresponding IC drive line
0xF95	R/W	DriverCH21	Screen 22 drives corresponding IC drive line
0xF96	R/W	DriverCH22	Screen 23 drives corresponding IC drive line
0xF97	R/W	DriverCH23	Screen 24 drives corresponding IC drive line
0xF98	R/W	DriverCH24	Screen 25 drives corresponding IC drive line
0xF99	R/W	DriverCH25	Screen 26 drives corresponding IC drive line
0xF9A	R/W	DriverCH26	Screen 27 drives corresponding IC drive line
0xF9B	R/W	DriverCH27	Screen 28 drives corresponding IC drive line
0xF9C	R/W	DriverCH28	Screen 29 drives corresponding IC drive line
0xF9D	R/W	NC	Reserved
0xF9E	R/W	SensorCH0	Screen 1 induction wire corresponds to IC drive line
0xF9F	R/W	SensorCH1	Screen 2 induction wire corresponds to IC drive line
0xFA0	R/W	SensorCH2	Screen 3 induction wire corresponds to IC drive line
0xFA1	R/W	SensorCH3	Screen 4 induction wire corresponds to IC drive line
0xFA2	R/W	SensorCH4	Screen 5 induction wire corresponds to IC drive line

0xFA3	R/W	SensorCH5	Screen 6 induction wire corresponds to IC drive line								
0xFA4	R/W	SensorCH6	Screen 7 induction wire corresponds to IC drive line								
0xFA5	R/W	SensorCH7	Screen 8 induction wire corresponds to IC drive line								
0xFA6	R/W	SensorCH8	Screen 9 induction wire corresponds to IC drive line								
0xFA7	R/W	SensorCH9	Screen 10 induction wire corresponds to IC drive line								
0xFA8	R/W	SensorCH10	Screen 11 induction wire corresponds to IC drive line								
0xFA9	R/W	SensorCH11	Screen 12 induction wire corresponds to IC drive line								
0xFAA	R/W	SensorCH12	Screen 13 induction wire corresponds to IC drive line								
0xFAB	R/W	SensorCH13	Screen 14 induction wire corresponds to IC drive line								
0xFAC	R/W	SensorCH13	Screen 15 induction wire corresponds to IC drive line								
0xFAD	R/W	SensorCH14	Screen 16 induction wire corresponds to IC drive line								
0XFAE~ 0XFB1	-	NC	Reserved								
0xFB2	R/W	ADCCFG	chip scanning control parameter								
0xFB3	R/W	SCAN	chip scanning control parameter								
0xFB4	R/W	F1SET	drive pulse 1 frequency								
0xFB5	R/W	F2SET	drive pulse 2 frequency								
0xFB6	R/W	F3SET	drive pulse 3 frequency								
0xFB7	R/W	F1PNUM	1 drive pulse								
0xFB8	R/W	F2PNUM	2 drive pulse								
0xFB9	R/W	F3PNUM	3 drive pulse								
0xFBA	R/W	F1DELAY	drive pulse 1 phase delay								
0xFBB	R/W	F2DELAY	drive pulse 2 phase delay								
0xFBC	R/W	F3DELAY	drive pulse 3 phase delay								
0xFBD	R/W	DC-DC	high pressure setting								
0xFBE	R/W	Sc_Touch	TP key threshold								
0xFBF	R/W	Sc_Leave	TP key up threshold								
0xFC0	R/W	Md_switch	Reserved	DD2: difference And half	Reserved	Shape_EN defamation denoise	INT pulse mode	SITO denoise switch	Reserved	Reserved	
0xFC1	R/W	LPower_C	Reserved	time to low power consumption without pressing: 0-63s valid, unit: S							
0xFC2	R/W	Refresh	0-100 valid; 0: period 10ms, 100: period 20ms								
0xFC3	R/W	Touch_N	Reserved	Reserved	Output touch point, 1-5 valid						
0xFC4	R/W	Output_Th	output limit: output until coordinate transformation value is higher than this, 0-254 configurable (unit:4 coordinate),255 means first pressing coordinate and keying up								
0xFC5	R/W	X_Ou_Max_H	X direction output maximum coordinate, the higher byte placed first								
0xFC6	R/W	X_Ou_Max_L									
0xFC7	R/W	Y_Ou_Max_H	Y direction output maximum coordinate, the higher byte placed first								
0xFC8	R/W	Y_Ou_Max_L									
0xFC9	R/W	X_Co_Sm	X direction slide control parameter, 0-255 configurable, 0 means closure								
0xFCA	R/W	Y_Co_Sm	Y direction slide control parameter, 0-255 configurable, 0 means closure								
0xFCB	R/W	X_Sp_Lim	X direction maximum speed limit of slide: 0-255 configurable, 0 means closure(unit: 16 coordinate)								
0xFCC	R/W	Y_Sp_Lim	Y direction maximum speed limit of slide: 0-255 configurable, 0 means closure(unit: 16 coordinate)								
0xFCD	R/W	Noise_R	sampling drop-driven				while noise elimination: 0-15 valid				
0xFCE	R/W	NC	Reserved								
0xFCF	R/W	Filter	Reserved			coordinate window filtering value (in base 4)					
0xFD0	R/W	Large_Tc	representative touch points for large area: 0-255 valid								
0xFD1	R/W	Shake_Cu	Touch Shake Count				Finger Number Shake Count				
0xFD2	R/W	Pos_Ref_T	benchmark update configuration in normal condition, 0-255 valid, 0 means close benchmark update								
0xFD3	R/W	NC	benchmark update configuration in sudden change condition,0-255 valid, 0 means								

			close benchmark update			
0xFD4	R/W	NC	Reserved			
0xFD5	R/W	NC	Reserved			
0xFD6	R/W	Edge_exp	Reserved		0: weak tensile 1: strong	
0xFD7	R/W	Tc_K_F	Key_com	Key_con	Reserved	valid interval in regional keys (unilateral): 0-15 valid
0xFD8	R/W	Key 1	Key 1 position: 0-255 valid, 0 means unavailable			
0xFD9	R/W	Key 2	Key 2 position: 0-255 valid, 0 means unavailable			
0xFDA	R/W	Key 3	Key 3 position: 0-255 valid, 0 means unavailable			
0xFDB	R/W	Key 4	Key 4 position: 0-255 valid, 0 means unavailable			
0xFDC	R/W	K_Touch	key threshold			
0xFDD	R/W	K_Leave	key up threshold			
0xFDE	R/W	K_SEC_max	upper limit of sub-maximum difference in independent key judgment			
0xFE0	R/W	K_DIS_min	lower limit of difference between maximum and sub-maximum in independent key judgment			
0xFE1	R/W	X_border_Lim_Near	discarded coordinate numbers on X proximal border			
0xFE2	R/W	X_border_Lim_Far	discarded coordinate numbers on X far end			
0xFE3	R/W	Y_border_Lim_Near	discarded coordinate numbers on Y proximal border			
0xFE4	R/W	Y_border_Lim_Far	discarded coordinate numbers on Y far end			
0xFE5	R/W	KEY_ADCCFG	FPC ADCCFG parameter (applicable to drive key common port)			
0xFE6	R/W	KEY_F1SET	FPC drive frequency setting (applicable to drive key common port)			
0xFE7	R/W	KEY_F1NUM	FPC drive pulse number setting (applicable to drive key common port)			
0xFE8	R/W	Key_Shake_Cu	touch key Shake counter (0-255)			
0xFE9	R/W	Key2_Touch	touch Level of FPC touch key2			
0xFE0	R/W	Key3_Touch	touch Level of FPC touch key3			
0xFE1	R/W	Key4_Touch	touch Level of FPC touch key4			
0xFEB~ 0xFEE	-	NC	Reserved			
0xFE2	R/W	Con_Frs	mark for configuration update, write 1 when master completing configuration information			
0xFE3	R/W	Cfg_Chk_H	configuration information checksum, the higher byte placed first			
0xFE4	R/W	Cfg_Chk_L				
0xFE5	R/W	System_Sta	Power_sta		Reserved	
0xFE6	R/W	LED_Con	LED_EN	LED_CM	LED_SW	time of light-on after key up (unit: S)
0xFE7	R/W	Command	Reserved			
0xFE8	R/W	Module_Type	Reserved		module supplier' ID: 0-2 valid	

### 11.7 CTP Interface and Data Format

Figure11-1 is the waveform of I2C fast mode timing

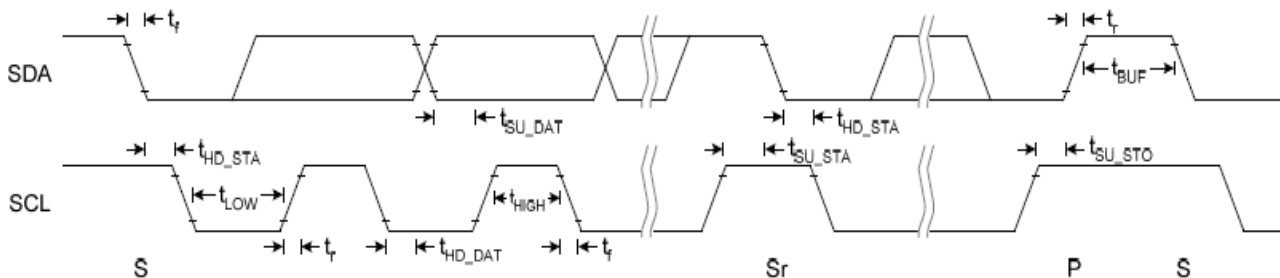


Figure11-1 I2C Waveform

Table is the timing characteristic of I2C fast mode plus

Conditions: VCC3.3=3.3V, GND=0V, T<sub>OP</sub>=25

Parameter	Symbol	Specification			
		MIN.	TYP.	MAX.	UNIT
SCL clock frequency	f <sub>SC</sub>	0	-	1000	kHz
Low period of the SCL clock	t <sub>LOW</sub>	0.5	-	-	us
High period of the SCL clock	t <sub>HIGH</sub>	0.26	-	-	us
Set up time for a repeated START condition	t <sub>SU_STA</sub>	0.26	-	-	us
Hold time for a repeated START condition. After this period, the first clock pulse is generated	t <sub>HD_STA</sub>	0.26	-	-	us
Data set up time	t <sub>SU DAT</sub>	50	-	-	ns
Data hold time	t <sub>HD DAT</sub>	0	-	-	us
Signal falling time of SDA and SCL	t <sub>f</sub>		-	120	ns
Signal rising time of SDA and SCL	t <sub>r</sub>			120	ns
Data set up time	t <sub>SU DAT</sub>	100			ns
Data hold time	t <sub>HD DAT</sub>	0		0.9	us
Set up time for STOP condition	t <sub>SU_STO</sub>	0.26			us
Bus free time between a STOP and START	t <sub>BUF</sub>	0.5			us
Capacitive load for each bus line	C <sub>b</sub>			550	pF

## 12. APPEARANCE SPECIFICATION

### 12.1 Inspection condition

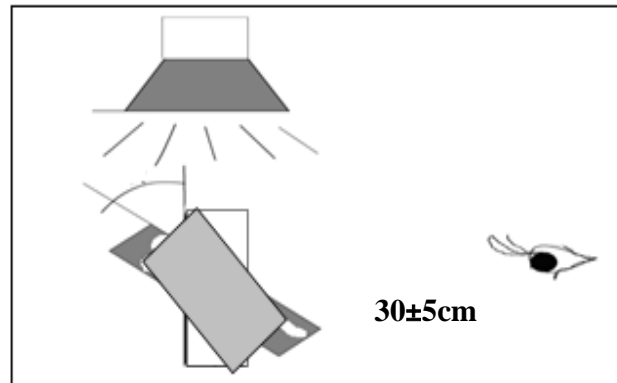
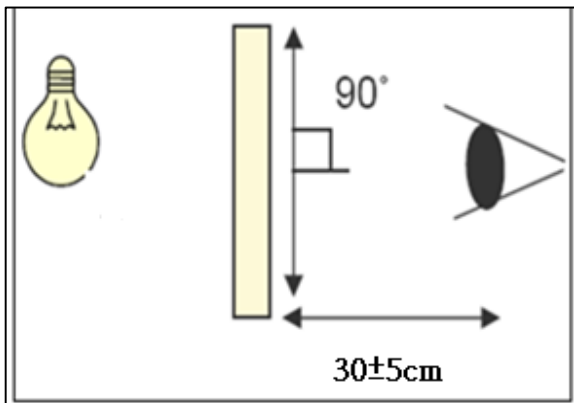
#### 12.1.1 Inspection conditions

12.1.1.1 Inspection Distance :  $30 \pm 5$  cm

12.1.1.2 View Angle :

(1) Inspection that light pervious to the product:  $90 \pm 15^\circ$

(2) Inspection that light reflects on the product:  $90 \pm 15^\circ$

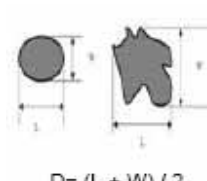
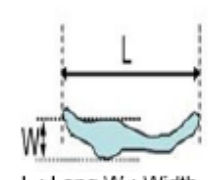


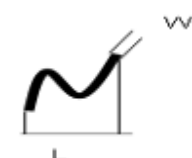
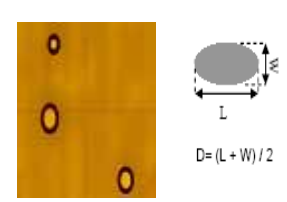
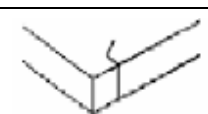
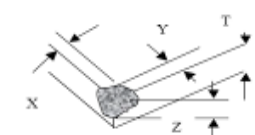
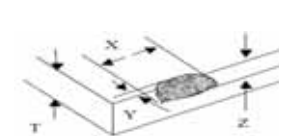
#### 12.1.2 Environment conditions :

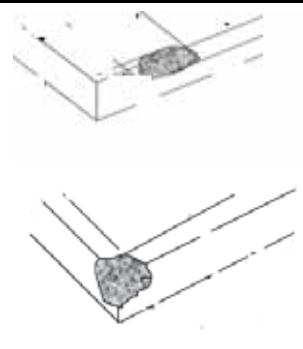

Ambient Temperature :	25±5
Ambient Humidity :	30~75%RH
Ambient Illumination	600~800 lux

### 12.2 Inspection Parameters

Appearance inspection standard (D: diameter, L: length; W: width, Z: height, T: glass thickness)

Inspection item	Inspection standard		Description
Foreign material in dot shape	SPEC (unit: mm)	Acceptable	 <p><math>D = (L + W) / 2</math></p>
	D 0.5	Ignored	
	$0.5 < D \leq 0.8$ , distance $> 5$	n 3	
	$D > 0.8$	0	
Foreign material in line shape	SPEC	Acceptable	 <p>L : Long W : Width</p>
	W 0.05 and L 7	Ignored	
	$0.05 < W \leq 0.08$ , L 7, distance $> 5$	n 3	
	$W > 0.08$ or $L > 7$	0	
Contamination	It is acceptable if the dirt can be wiped.		

Scratch	SPEC	Acceptable	
	$W \leq 0.05$ and $L \leq 7$	Ignored	
	$0.05 < W \leq 0.08$ , $L \leq 7$ , distance $> 5$	n 3	
	$0.08 < W \leq 0.1$ , $L \leq 7$ , distance $> 5$	n 2	
	$W > 0.1$ or $L > 7$	0	
Inspection item	SPEC		Description
Bubble	SPEC (unit: mm)	Acceptable	
	$D \leq 0.2$	Ignored	
	Non visible area	Ignored	
	$0.2 < D \leq 0.3$ , distance $> 5$	n 3	
	$D > 0.3$	0	
Cover & Sensor Crack	Prohibited		
Cover angle missing	SPEC (unit: mm)	Acceptable	
	Side/Bottom	Ignored	
	It is prohibited if the defect appears on the front.	0	
Inspection item	SPEC		Description
Cover edge break	SPEC (unit: mm)	Acceptable	
	$X \leq 2.0$ , $Y \leq 2.0$ , $Z \leq T$	Ignored	
	$X > 2.0$ , $Y > 2.0$ , $Z > T$	0	

Sensor angle missing/edge break	SPEC (unit: mm)	Acceptable	
	Damage circuit or function.	0	
	It can be seen from the front of cover visible area.	0	
Sensor flange	SPEC (unit: mm)	Acceptable	
	Do not affect assembly.	Ignored	
Ink	SPEC (unit: mm)	Acceptable	
	word unclear, inverted, mistake, break line	0	
Bubble under protection film	SPEC (unit: mm)	Acceptable	
	NA		
Function	Prohibited		

### 12.3 Sampling Condition

Unless otherwise agree in written, the sampling inspection shall be applied to the incoming inspection of customer.

Lot size: Quantity of shipment lot per model.

Sampling type: normal inspection, single sampling

Sampling table: MIL-STD-105E

Inspection level: Level II

Class of defects	Definition		
	<b>Major</b>	AQL 0.65%	It is a defect that is likely to result in failure or to reduce materially the usability of the product for the intended function.
<b>Minor</b>	AQL 1.5%	It is a defect that will not result in functioning problem with deviation classified.	



### 13. QUALITY ASSURANCE

#### 13.1 Test Condition

##### 13.1.1 Temperature and Humidity(Ambient Temperature)

Temperature :  $25 \pm 5^{\circ}\text{C}$

Humidity :  $65 \pm 5\%$

##### 13.1.2 Operation

Unless specified otherwise, test will be conducted under function state.

##### 13.1.3 Container

Unless specified otherwise, vibration test will be conducted to the product itself without putting it in a container.

##### 13.1.4 Test Frequency

In case of related to deterioration such as shock test. It will be conducted only once.

##### 13.1.5 Test Method

Reliability Test Item & Level		Test Level	Remark
No.	Test Item		
1.	Low Temperature Storage Test	T=-30 ,240hrs	IEC68-2-1
2.	High Temperature Storage Test	T=80 ,240hrs	IEC68-2-2
3.	Low Temperature Operation Test	T=-20 ,240hrs	IEC68-2-1
4.	High Temperature Operation Test	T=70 ,240hrs	IEC68-2-2
5.	High Temperature and High Humidity Operation Test	T=60 ,90%RH,240hrs	IEC68-2-3
6.	Thermal Cycling Test (No operation)	-30 → +25 → +80 ,100 Cycles 30 min 5 min 30 min	IEC68-2-14
7.	Vibration Test (No operation)	Frequency :10 ~ 55 HZ Amplitude :1.5 mm Sweep time : 11 mins Test Period: 6 Cycles for each direction of X, Y, Z	IEC68-2-6
8.	ESD TEST	Air Discharge : $\pm 15\text{KV}$ Indirect Contact Discharge : $\pm 8\text{KV}$	IEC-61000-4-2

#### 13.2 Judgment standard

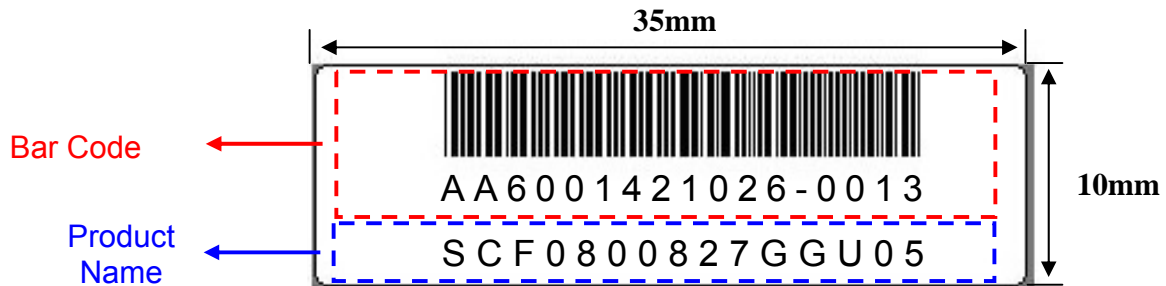
The Judgment of the above test should be made after exposure in room temperature for two hours as follow:

Pass: Normal display image with no obvious non-uniformity and no line defect. Partial transformation of the module parts should be ignored.

Fail: No display image, obvious non-uniformity, or line defect.

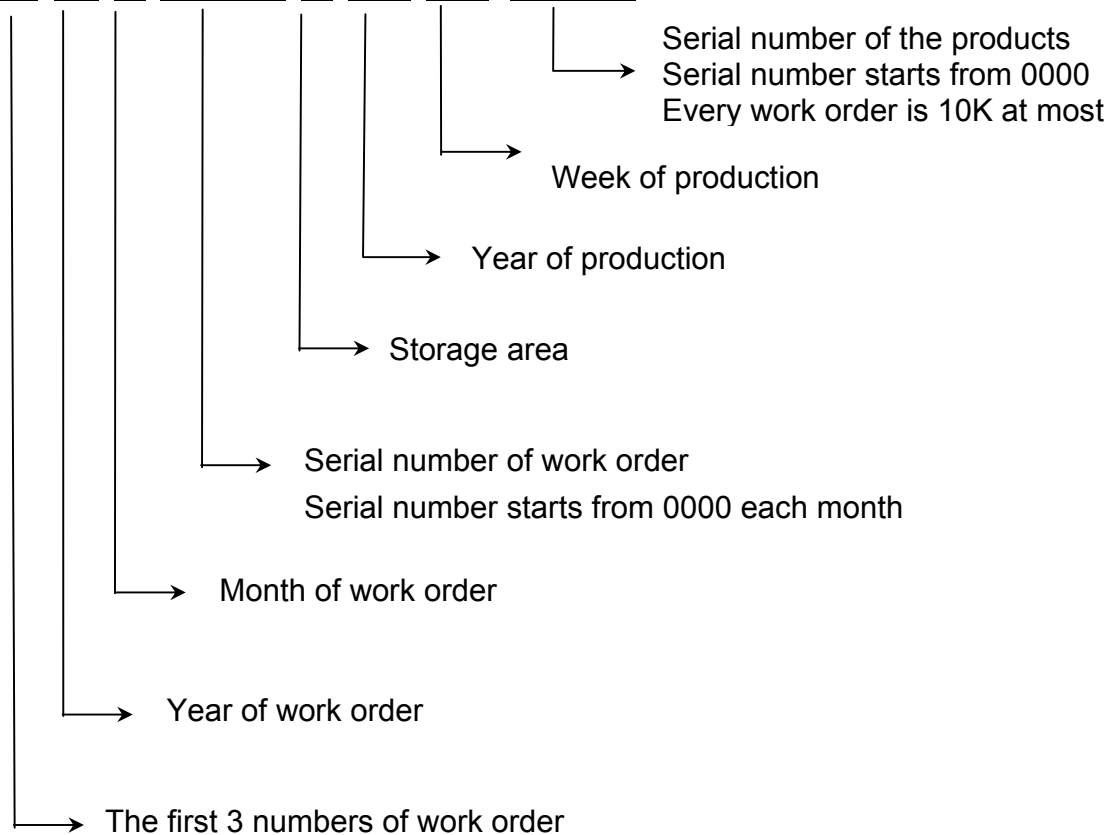
## 14. LCM PRODUCT LABEL DEFINE

Product Label style:

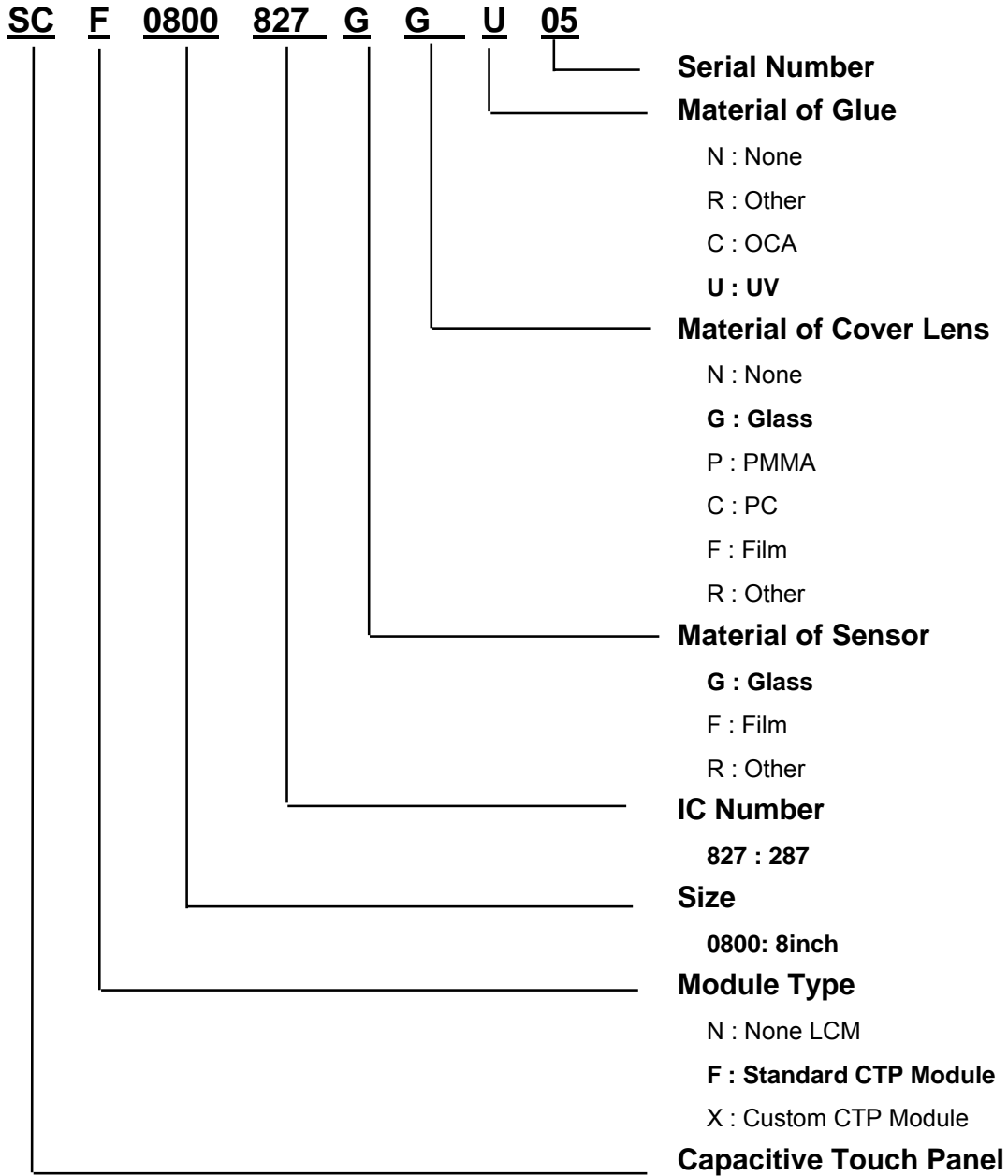


BarCode Define:

**A A 6 0014 2 10 26-0013**



**Product Name Define:**



## 15. PRECAUTIONS IN USE LCM

### 1. ASSEMBLY PRECAUTIONS

- (1) Since Touch Panel is consist of glass, please be careful your hands to be injured during handing. You must wear gloves during handing.
- (2) Do not touch, push or rub the exposed touch panel, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment.
- (3) Do not stack the touch panels together. Do not put heavy objects on touch panel.
- (4) Please do not take a CTP to pieces and reconstruct it. Resolving and reconstructing modules may cause them not to work well.
- (5) Please excessive force or strain to the panel or tail is prohibited, Do not lift touch panel by cable (FPC).
- (6) Use clean sacks or glove to prevent fingerprints and/or stains left on the panel. Extra attention and carefulness should be taken while handling the glass edge.
- (7) Please pay attention for the matters stated below at mounting design of touch panel enclosure. Enclosure support to fix touch panel must be out of active area.(do not design enclosure presses the active area to protect from miss put)

### 2. OPERATING PRECAUTIONS

- (1) Please be sure to turn off the power supply before connecting and disconnecting signal input cable.
- (2) Please do not change variable resistance settings in CTP. They are adjusted to the most suitable value. If they are changed, it might happen CTP does not satisfy the characteristics specification
- (3) Be careful for condensation at sudden temperature change. Condensation makes damage to sensor or electrical contacted parts.
- (4) CTP has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimize the interference.
- (5) Touch the panel with your finger or stylus only to assure normal operation. Any sharp edged or hard objects are prohibited.
- (6) Operate the panel in a steady environment. Abrupt variation on temperature and humidity may cause malfunction of the panel.

### 3. ELECTROSTATIC DISCHARGE CONTROL

- (1) The operator should be grounded whenever he/she comes into contact with the CTP. Never touch any of the conductive parts such the copper leads on the FPC and the interface terminals with any parts of the human body.

- (2) The CTP should be kept in antistatic bags or other containers resistant to static for storage.
- (3) Only properly grounded soldering irons should be used.
- (4) If an electric screwdriver is used, it should be well grounded and shielded from commentator sparks.
- (5) The normal static prevention measures should be observed for work clothes and working benches; for the latter conductive (rubber) mat is recommended
- (6) Since dry air is inductive to statics, a relative humidity of 50-60% is recommended.

### 4. STORAGE PRECAUTIONS

- (1) When you store touch panel for a long time, it is recommended to keep the temperature between 0°C-40°C without the exposure of sunlight and to keep the humidity less than 90%RH.
- (2) Please do not leave touch panel in the environment of high humidity and high temperature such as 60°C 90%RH
- (3) Please do not leave touch panel in the environment of low temperature; below -20°C.

### 5. OTHERS

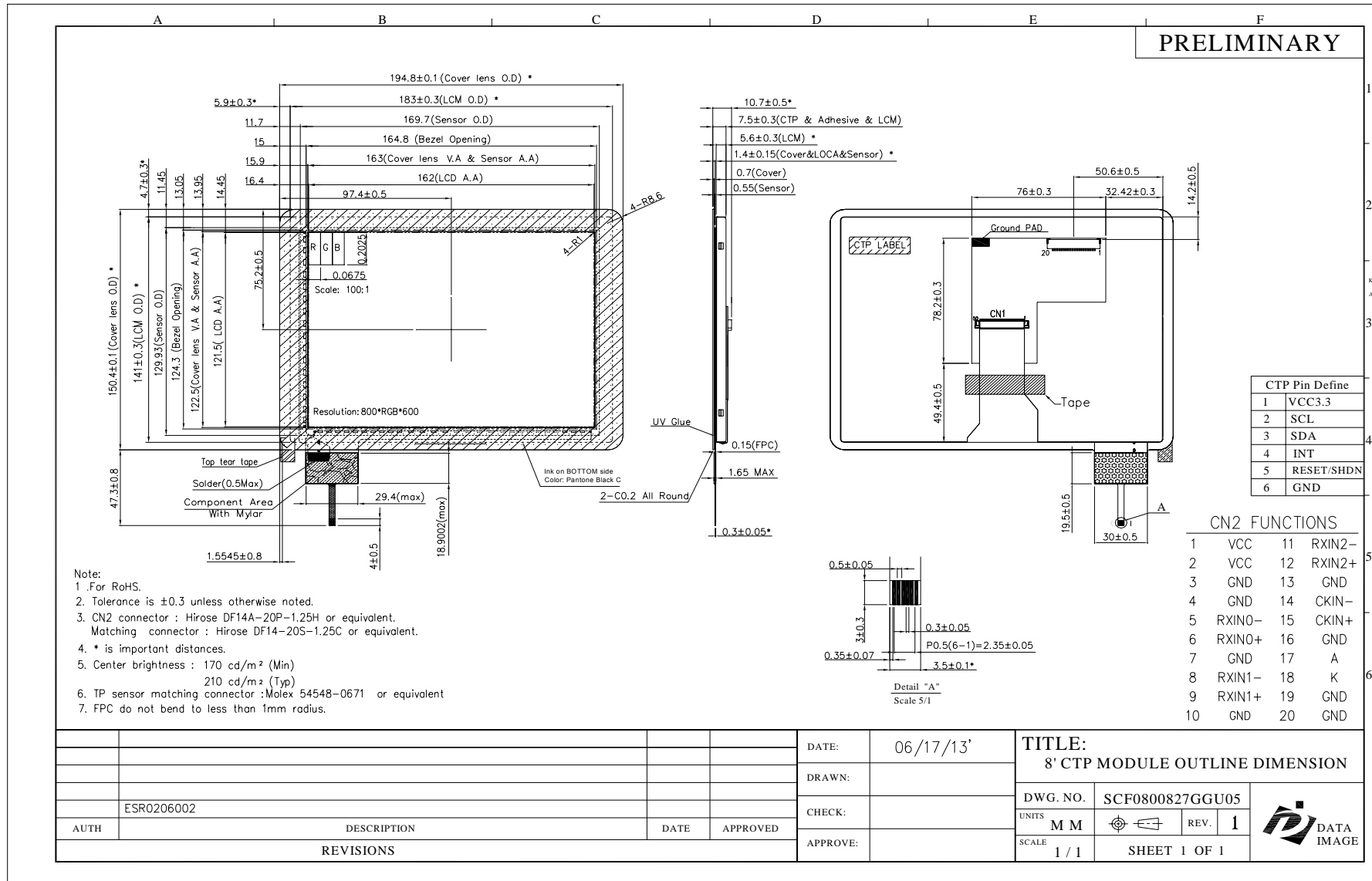
For the packaging box, please pay attention to the followings:

- (1) Please do not pile them up more than 5 boxes. (They are not designed so.) And please do not turn over.
- (2) Please handle packaging box with care not to give them sudden shock and vibrations. And also please do not throw them up.
- (3) Packing box and inner case for CTP are made of cardboard. So please pay attention not to get them wet. (Such like keeping them in high humidity or wet place can occur getting them wet.)

### 6. LIMITED WARRANTY

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

# 16. OUTLINE DRAWING



## 17. PACKAGE INFORMATION

T.B.D.