

TFT-DISPLAY DATASHEET

ONation
Model: OT070BGDDL-H0

BRIEF SPEC.:

Main Feature	LandscapeType Transmissive Touch
Active Screen Area	154.08 x 85.92 [mm]
Diagonal Format	7 " 15:9
Resolution	800 X 480
Colors	[6 Bit]
Backlight	LED
Brightness	800 cd/m ²
LED Life Time	
Interface	LVDS
Viewing Angle	70/70 L/R 50/79 up/down
Touchscreen	yes
Power Supply	3.3 V [Typ.]
Module Outline	175.88 x 112.52 x 12 [mm]
Operation Temperature	-20... +60 °C
Storage Temperature	-30... +70 °C
Surface Treatment	



ONation Corporation

TFT COLOR LCD MODULE

MODEL: OT070BGDDLT-H0
(Complied with RoHS)

WVGA
LVDS interface (1port)

Version: P0.1

Customer : _____
Approved By : _____
Date: _____

ONATION		
APPROVAL	CHECKER	PREPARE
<i>Ian</i>	<i>Josh</i>	<i>Roger</i>

All information is subject to change without notice.
Please confirm the sales representative before starting to design your system

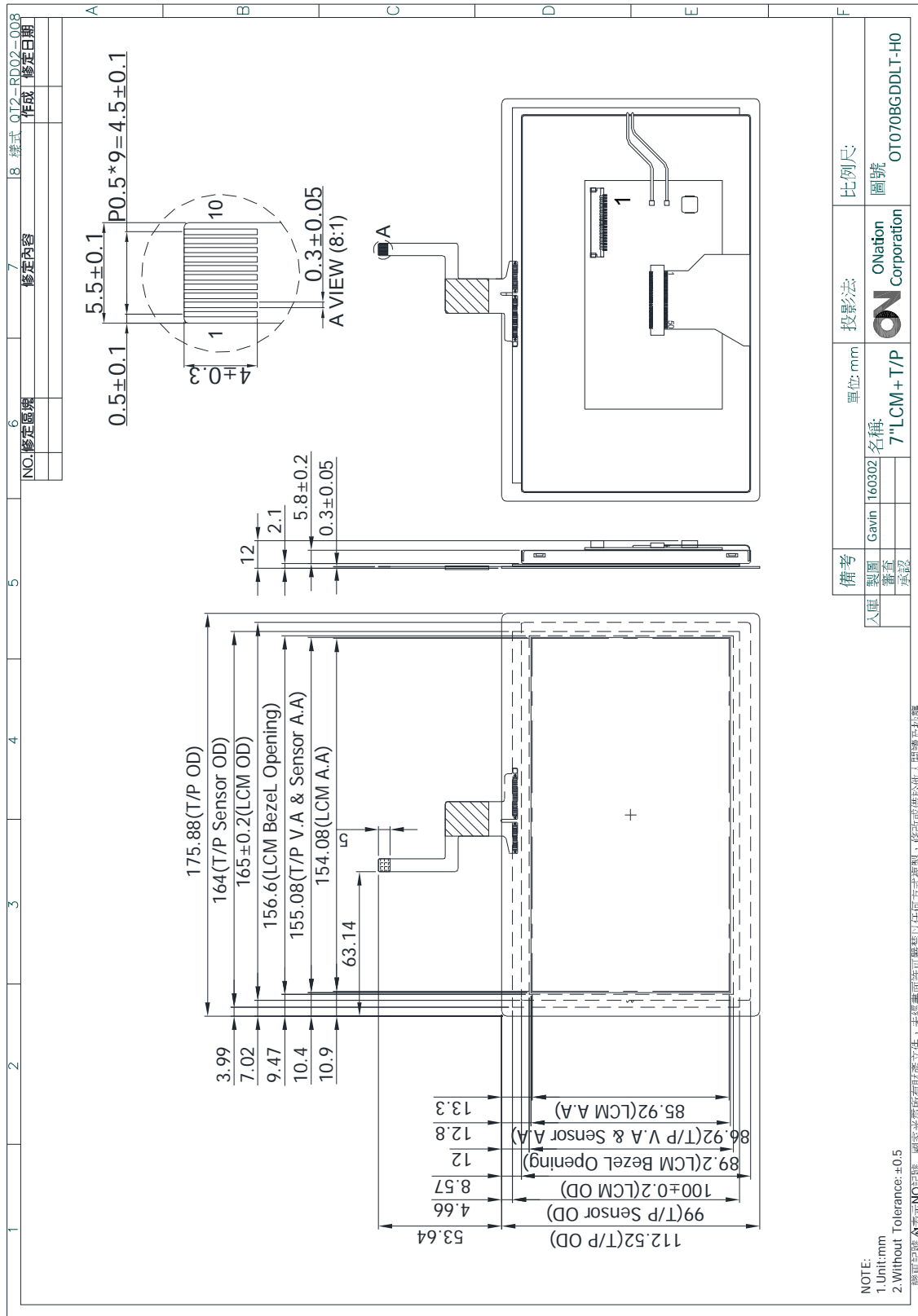
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2.MECHANICAL SPECIFICATIONS

(1)	Number Of Dots (Dots)	800R.G.B X 480
(2)	Module Size(mm)	175.88(W) X112.52(H) X12 (D)
(3)	Active Area(mm)	154.08(W) X85.92(H)
(4)	Pixel Pitch(mm)	0.1926(W) X0.1790(H)
(5)	LCD Model	TFT , Transmissive
(6)	LED Backlight Color	White
(7)	Viewing Direction	12 o'clock Horizontal :Right side(70°)(Typ),Left side(70°)(Typ) Vertical: Up side (50°)(Typ),Down side(70°)(Typ)
(8)	Gray Scale Inversion Direction	6 o'clock
(9)	Color Configuration	R.G.B Vertical Stripe
(10)	Module Weight(g)	TBD
(11)	Interface	LVDS

3. OUTLINE DIMENSIONS



4. INTERFACE PIN CONNECTION

4.1 LCM PANEL DRIVING SECTION

Connector : Hirose DF14A-20P-1.25H or Equivalen

Mating Connector : Hirose DF14-20S-1.25C or Equivalen

PIN NO.	SIGNAL	FUNCTION	REMARK
1	VCC	Power supply for digital circuit	
2	VCC	Power supply for digital circuit	
3	GND	Ground	
4	GND	Ground	
5	RxIN0-	Differential data input,CH0(Negative)	
6	RxIN0+	Differential data input,CH0(Positive)	
7	GND	Ground	
8	RxIN1-	Differential data input,CH1(Negative)	
9	RxIN1+	Differential data input,CH1(Positive)	
10	GND	Ground	
11	RxIN2-	Differential data input,CH2(Negative)	
12	RxIN2+	Differential data input,CH2(Positive)	
13	GND	Ground	
14	RxCLKIN-	Differential clock input (Negative)	
15	RxCLKIN+	Differential clock input (Positive)	
16	GND	Ground	
17	VLED	Power supply for LED circuit	
18	VLED	Power supply for LED circuit	
19	GND	Ground	
20	ADJ	Brightness control for LED B/L	

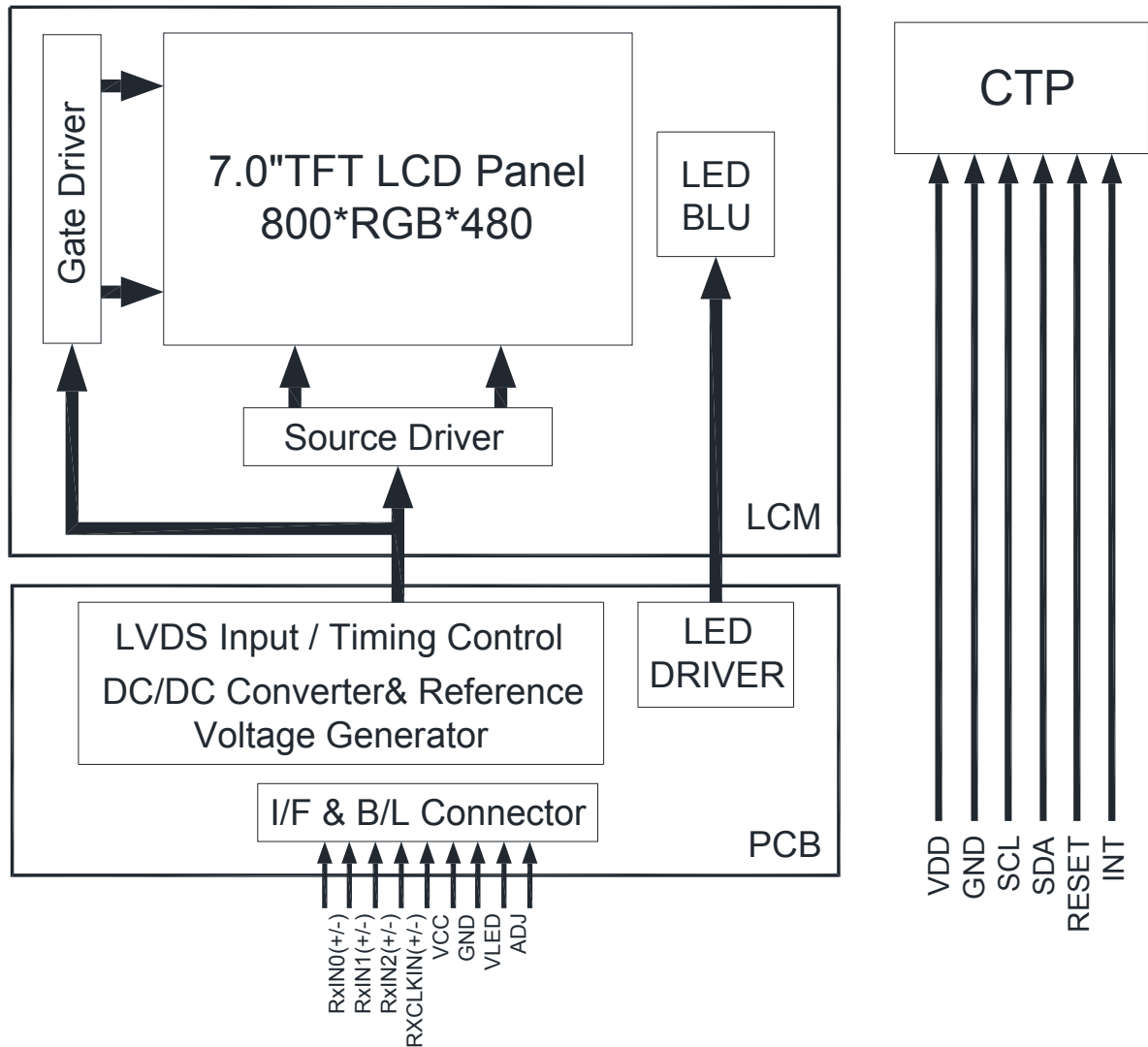
I: input, O: output, P: Power

4.2 CTP PIN ASSIGNMENT

FPC PITCH=0.5mm

PIN NO.	SIGNAL
1	RST
2	VDD
3	GND
4	INT
5	SDA
6	SCL
7	NC
8	NC
9	NC
10	NC

5. BLOCK DIAGRAM



6.ABSOLUTE MAXIMUM RATINGS

6.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
Power voltage	VCC	-0.3	4.0	V	
	VLED	-0.3	50	V	

Note1: The absolute maximum rating values of this product not allowed to be exceeded at any times. Should be module be used with any of absolute maximum ratings exceeded. The characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

6.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE		REMARK
	MIN	MAX	MIN	MAX	
Ambient Temperature(°C)	-20	(60)	-30	70	Note 1 , 2
Humidity(% RH)	Note 3		Note 3		Without condensation

Note 1 : The response time will become lower when operated at low temperature.

Note 2 : Background color changes slightly depending on ambient temperature.

Note 3 : Storage Ta=60°C & RH=90% ≤ 96Hrs

7.ELECTRICAL CHARACTERISTICS

7.1 ELECTRICAL CHARACTERISTICS OF LCD

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
Power voltage	VCC	3.0	3.3	3.6	V	-
Current for Driver	ICC	-	TBD	TBD	mA	VCC=3.3V

Note 1 : Test condition : VCC=3.3V ; Test Pattern : All Black

7.2 BACKLIGHT UNIT

Ta=25°C

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
Operating Voltage	VLED	11	12	13	V	
Operating Current	ILED	-	TBD	-	mA	
ADJ Input Voltage	VIH	0.6	-	-	V	
	VIL	-	-	0.4		
ADJ Frequency	-	100	-	2K	HZ	
LED life time	-	-	TBD	-	Hr	

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25°C and PWM=100%

Note 2: The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25°C and PWM=100%.The LED lifetime could be decreased if operation ILED is larger than PWM=100%

8.OPTICAL CHARACTERISTICS

Ta=25°C

ITEM	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT	REMARK
Contrast Ratio	CR	Viewing Normal Angle $\Theta_x=\Theta_y=0^\circ$	-	500	-	-	Note 1
Response Time	TR+TF		-	25	-	ms	Note 2
Color chromaticity	White		x	TBD	TBD	TBD	-
		y	TBD	TBD	TBD	-	
Viewing Angle	Hor.	θ_L	-	(70)	-	Deg.	Note 3
		θ_R	-	(70)	-		
	Ver.	θ_T	-	(50)	-		
		θ_B	-	(70)	-		
Luminance	L	PWM=100%	-	(800)	-	cd/m2	
Luminance Uniformity	YU		-	75	-	%	Note 5

Note 1 : Definition of Contrast Ratio (CR) :

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = L_{63}/L_0$$

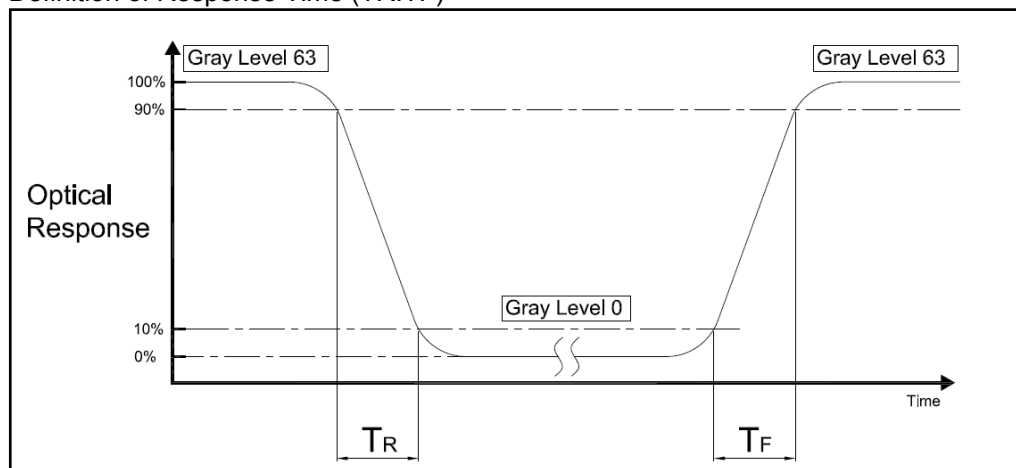
L63 : Luminance of gray level 63

L0 : Luminance of gray level 0

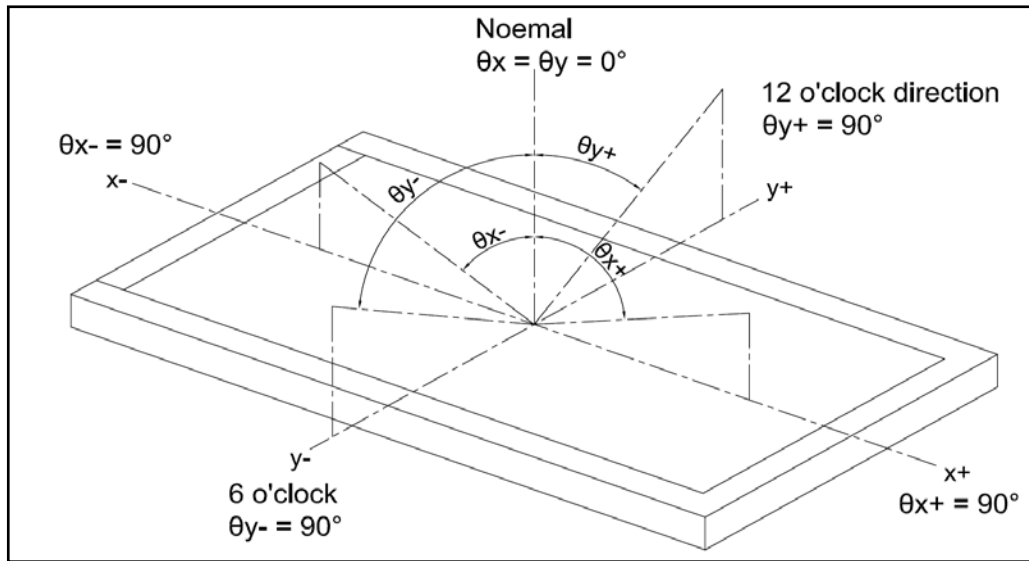
$$CR = CR(5)$$

CR(X) is corresponding to the Contrast Ratio of the point X at Figure in Note 5

Note 2 : Definition of Response Time (TR,TF)



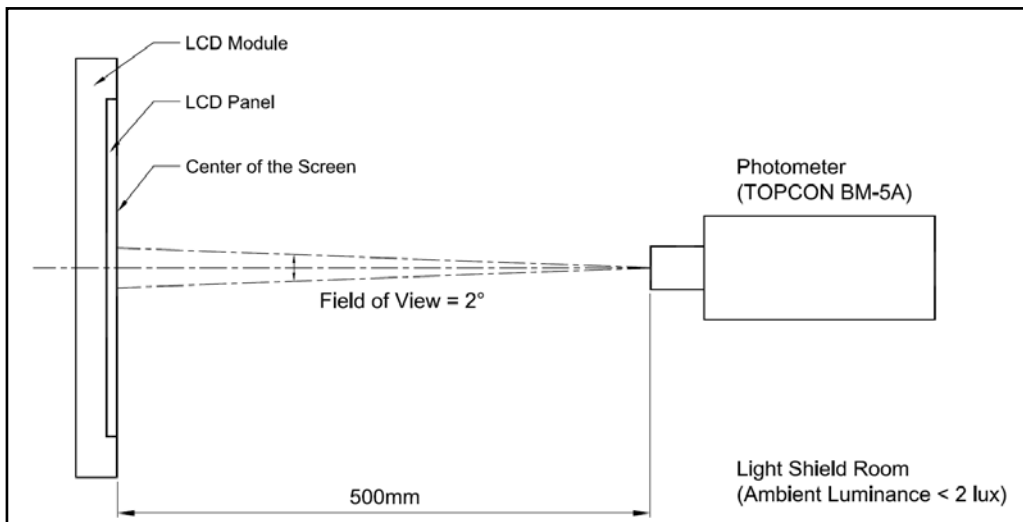
Note 3 : Definition of Viewing Angle



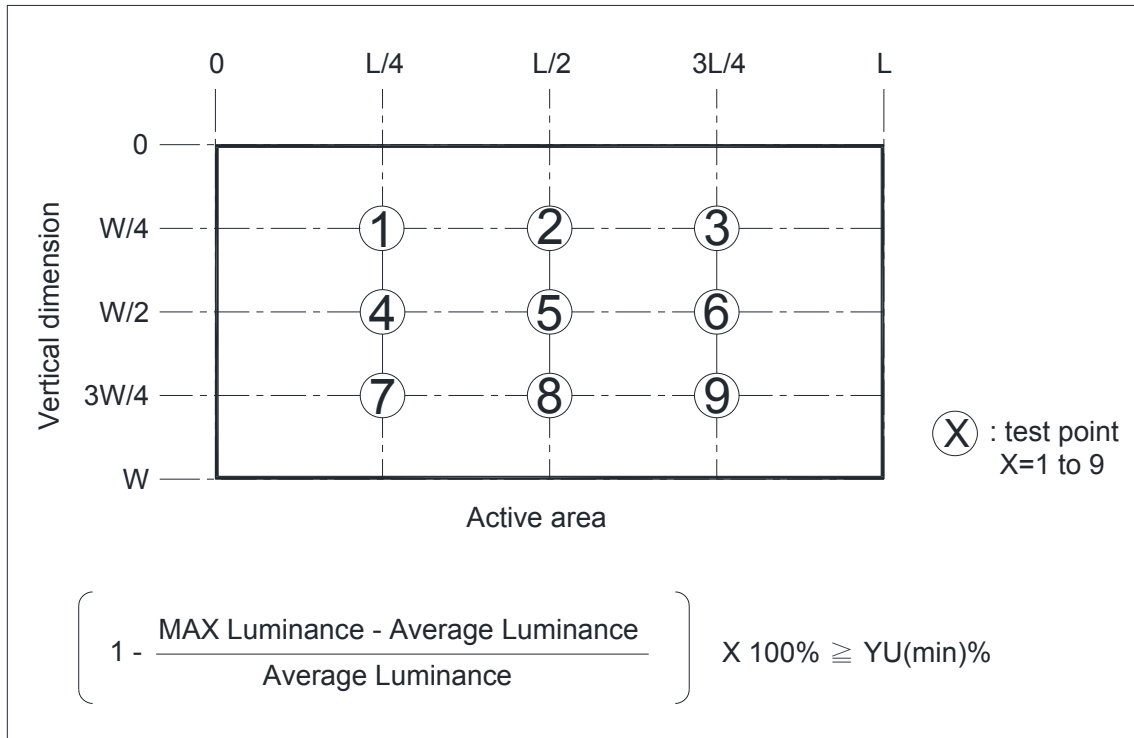
Note 4 :

Measurement Set-Up:

The LCD module should be stabilized at a given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.

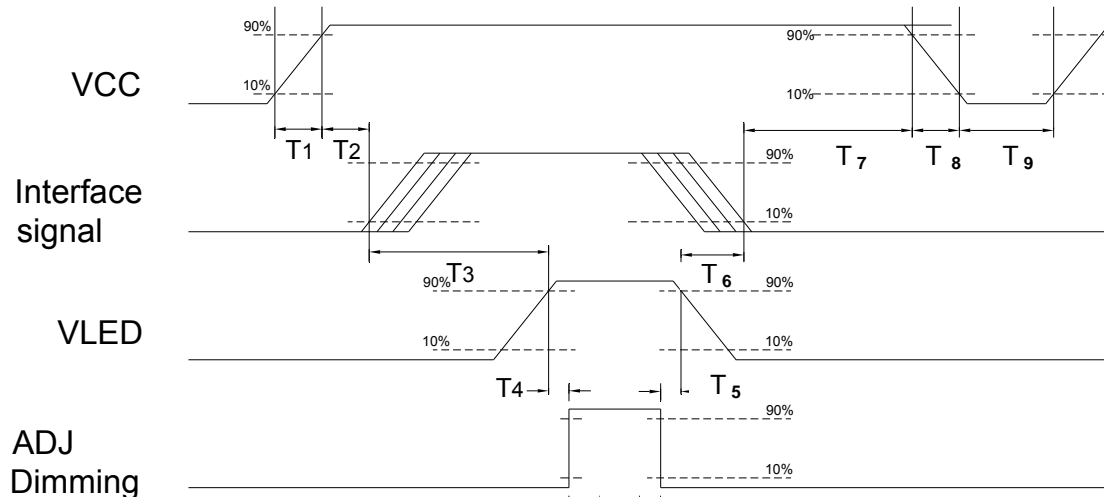


Note 5 :



9. TIMING SPECIFICATIONS

9.1 POWER SIGNAL SEQUENCE

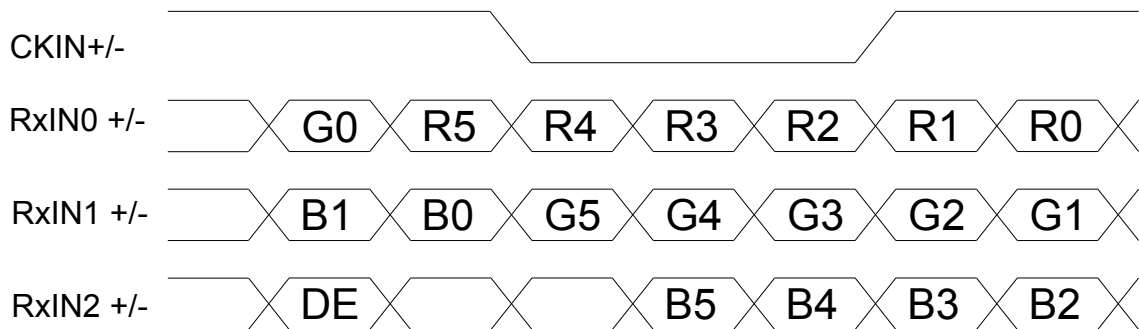


Power ON/OFF sequence timing

ITEM	MIN.	TYP.	MAX.	UNIT
T1	0.5	-	10	ms
T2	0	-	50	ms
T3	200	-	-	ms
T4	10	-	-	ms
T5	10	-	-	ms
T6	100	-	-	ms
T7	0	16	50	ms
T8	-	-	10	ms
T9	1000	-	-	ms

The above on/off sequence should be applied to avoid abnormal function in the display. Please make sure to turn off the power when you plug the cable into the input connector or pull the cable out of the connector.

9.2 THE INPUT DATA FORMAT

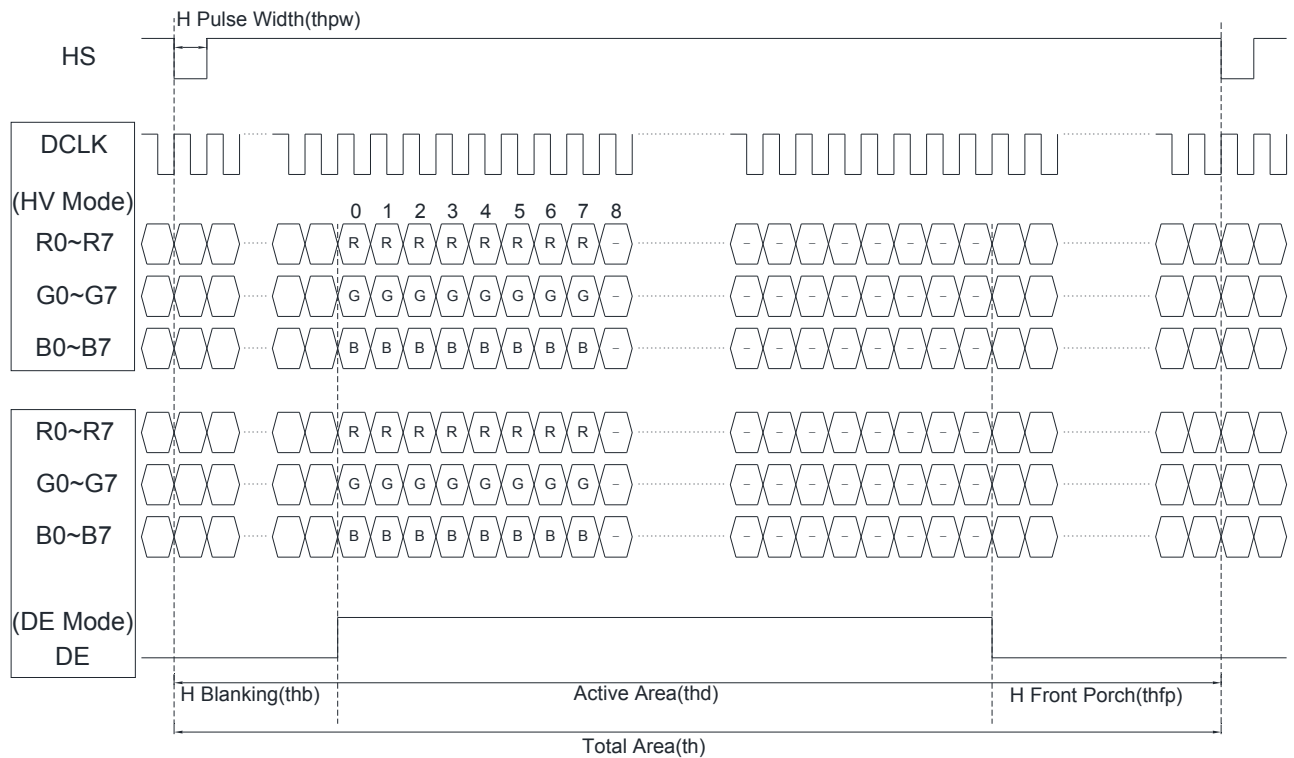


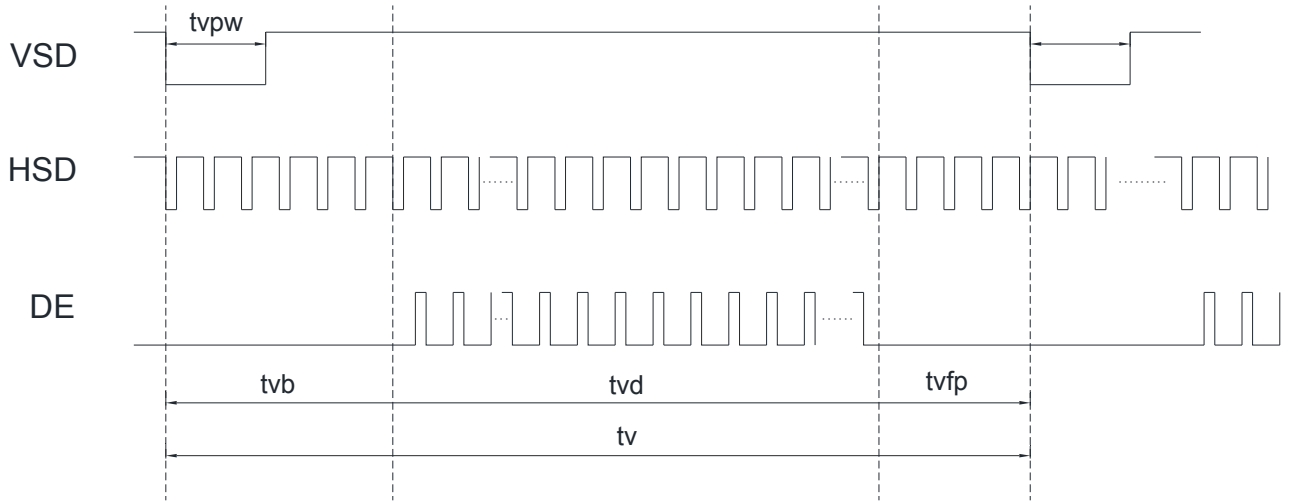
SIGNAL NAME	DESCRIPTION	REMARK
R5 R4 R3 R2 R1 R0	Red Data 5 Red Data 4 Red Data 3 Red Data 2 Red Data 1 Red Data 0	Red-pixel Data 6Bits LVDS input MSB : R5 ; LSB : R0
G5 G4 G3 G2 G1 G0	Green Data 5 Green Data 4 Green Data 3 Green Data 2 Green Data 1 Green Data 0	Green-pixel Data 6Bits LVDS input MSB : G5 ; LSB : G0
B5 B4 B3 B2 B1 B0	Blue Data 5 Blue Data 4 Blue Data 3 Blue Data 2 Blue Data 1 Blue Data 0	Blue-pixel Data 6Bits LVDS input MSB : B5 ; LSB : B0
CKIN	LVDS Data Clock	
DE	Data Enable Signal	When the signal is high, the pixel data shall be valid to be displayed.

9.3 AC TIMING CHARATERISTICS

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	REMARK
Horizontal Display Area	thd	-	800	-	DCLK	
DCLK Frequency	fclk	26.4	33.3	46.8	MHz	
One Horizontal Line	th	862	1056	1200	DCLK	
HS pulse width	thpw	1	-	40	DCLK	
HS Blanking	thb	46	46	46	DCLK	
HS Front Porch	thfp	16	210	354	DCLK	

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	REMARK
Vertical Display Area	tvd	-	480	-	TH	
VS period time	tv	510	525	650	TH	
VS pulse width	tvpw	1	-	20	TH	
VS Blanking	tvb	23	23	23	TH	
VS Front Porch	tvfp	7	22	147	TH	

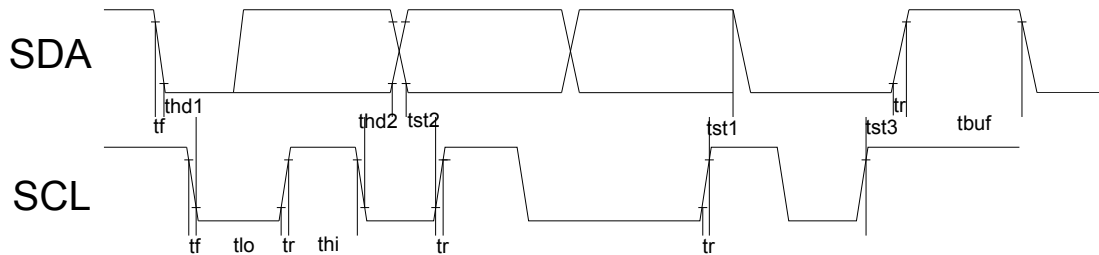




10. TOUCH PANEL SPECIFICATIONS

10.1 I2C Communication

GT911 provides standard I2C interface for communication. In the system, GT911 always works in slave mode, all communications are initiated by master, and the baud rate can be up to 400K bps. The definition of I2C timing is as following:



Test condition1: 1.8V communication interface, 400Kbps, pull up resistor is 2K ohm

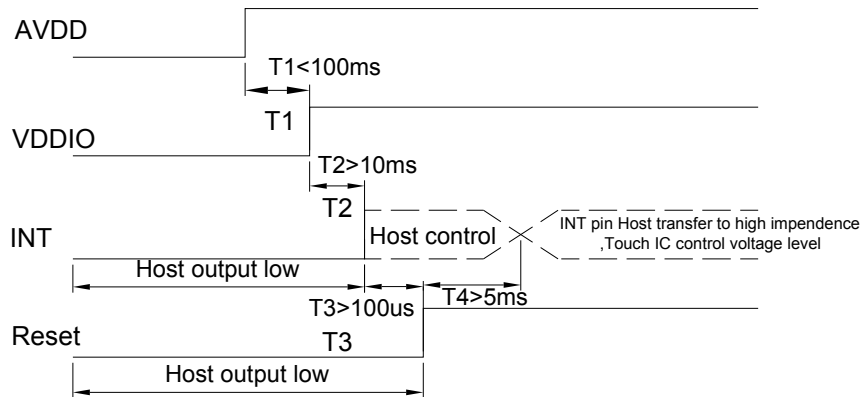
ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
SCL low period	to	0.9	-	us	
SCL high period	thi	0.8	-	us	
SCL setup time for START condition	tst1	0.4	-	us	
SCL setup time for STOP condition	tst3	0.4	-	us	
SCL hold time for START condition	thd1	0.3	-	us	
SDA setup time	tst2	0.4	-	us	
SDA hold time	thd2	0.4	-	us	

Test condition2: 3.3V communication interface, 400Kbps, pull up resistor is 2K ohm

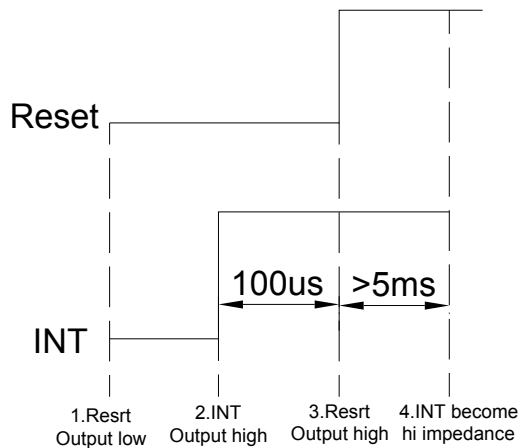
ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
SCL low period	to	0.9	-	us	
SCL high period	thi	0.8	-	us	
SCL setup time for START condition	tst1	0.4	-	us	
SCL setup time for STOP condition	tst3	0.4	-	us	
SCL hold time for START condition	thd1	0.3	-	us	
SDA setup time	tst2	0.4	-	us	
SDA hold time	thd2	0.4	-	us	

GT911 has 2 sets of slave address 0xBA/0xBB & 0x28/29. Master can control Reset & INT pin to configure the slave address in power on initial state like following:

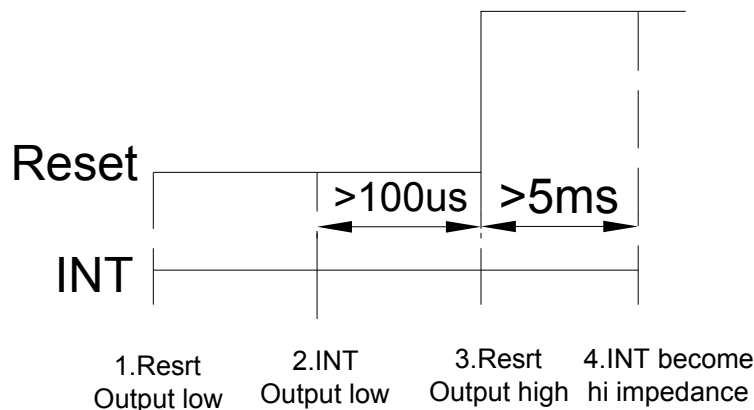
Power on diagram:



Timing of setting slave address to 0x28/0x29:



Timing of setting slave address to 0xBA/0xBB:



a) Data Transmission

(ex: slave address is 0xBA/0xBB)

Communication is always initiated by master, A high-to-low transition of SDA with SCL high is a start condition.

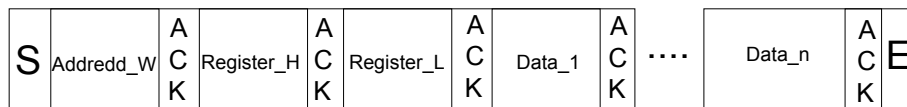
All addressing signal are serially transmitted to and from on bus in 8-bit word. GT911 sends a "0" to acknowledge when the addressing word is 0xBA/BB (or 0x28/0x29). This happens during the ninth clock cycle. If the slave address is not matched, GT911 will stay in idle state.

The data words are serially transmitted to and from in 9-bit formation: 8-bit data + 1-bit ACK or NACK sent by GT911. Data changes during SCL low periods & keeps valid during SCL high.

A low-to-high transition of SDA with SCL high is a stop condition

b) Write Data to GT911

(ex: slave address is 0xBA/0xBB)



Write operations

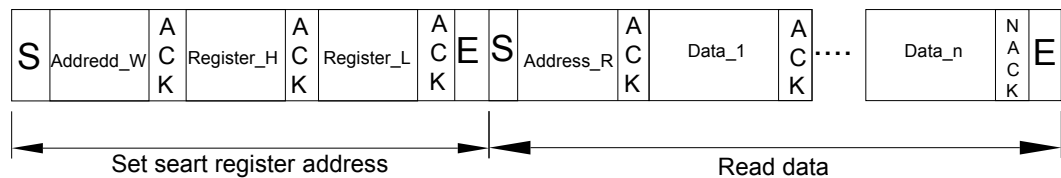
Please check the above figure, master start the communication first, and then sends device address 0xBA preparing for a write operation.

After receiving ACK from GT911, master sends out 16-bit register address, and then the data word in 8-bit, which is going to be wrote into GT911.

The address pointer of GT911 will automatically increase one after one byte writing, so master can sequentially write in one operation. When operation finished, master stop the communication.

c) Read Data from GT911

(ex: slave address is 0xBA/0xBB)



Read operations

Please check the above figure, master start the communication first, and then sends device address 0xBA for a write operation.

After receiving ACK from GT911, master sends out 16-bit register address, to set the address pointer of GT911. After receiving ACK, master produce start signal once again & send device address 0xBB , then read data word from GT911 in 8-bit.

GT911 also supports sequential read operation, and the default setting is sequential read mode.

Master shall send out ACK after every byte reading successfully but NACK after the last one. Then sends stop signal to finish the communication.

10.2 Register Information of GT911

a) Real Time Order

(Write Only)

Addr	Name	Bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
0x8040	Command	0: read coordinate 1: read diff data or raw data 2: software reset3:baseline update 4: baseline calibration 5: screen off 3&4 are still internal test							

b) Configuration Information

(R/W)

Addr	Name	Bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
0x8047	Config_Version	Version of the configuration							
0x8048	X Output Max (Low Byts)	Resolution of X axis							
0x8049	X Output Max (High Byts)								
0x804A	Y Output Max (Low Byts)	Resolution of Y axis							
0x804B	Y Output Max (High Byts)								
0x804C	Touch Number	Reserved				Touch number:1~5			
0x804D	Module_Switch1	Reserved	Stretch_rank	X2Y	Reserved	INT trigger method 00: rising edge trigger 01: falling edge trigger 02 low level enquiry 03 high level enquiry			
0x804E	Module_switch2	Reserved							
0x804F	Shake_Count	Reserved				Finger shake count			
0x8050	Filter	First_Filter	Normal_Filter (filtering value of original coordinate window, coefficient is 1)						
0x8051	Large_Touch	Number of touch in large area							
0x8052	Noise_Reduction	Reserved				Value of noise elimination (coefficient is 1, 0~15)			
0x8053	Screen_Touch_Level	Threshold of touch grow out of nothing							
0x8054	Screen_Touch_Level	Threshold of touch grow out of nothing							
0x8055	Low_Power_Control	Reserved				Time to low power consumption(0~15s)			
0x8056	Refresh_Rate	Reserved				Coordinate report rate (Cycle: 5+N ms)			
0x8057	x_threshold	Reserved							
0x8058	y_threshold								
0x8059	X_Speed_Limit	Reserved							
0x805A	Y_Speed_Limit								
0x805B	Space	Blank area of boarder-top (coefficient is 32)				Blank area of Boarder-bottom (coefficient is 32)			
0x805C		Blank area of boarder-left (coefficient is 32)				Blank area of Boarder-right (coefficient is 32)			
0x805D		Reserved				Level of weak stretch (Stretch X/16 Pitch) (beta version is valid , published version is not)			

0x805E	Stretch_R0	Interval 1 coefficient			
0x805F	Stretch_R1	Interval 2 coefficient			
0x8060	Stretch_R2	Interval 3 coefficient			
0x8061	Stretch_RM	All intervals base number			
0x8062	Drv_GroupA_Num	All_Driving	Reserved	Driver_Group_A_number	
0x8063	Drv_GroupB_Num	Reserved		Driver_Group_B_number	
0x8064	Sensor_Num	Sensor_Group_B_Number		Sensor_Group_A_Number	
0x8065	FreqA_factor	Driver frequency double frequency coefficient of Driver group A GroupA_Frequency =Multiplier factor * baseband			
0x8066	FreqB_factor	Driver frequency double frequency coefficient of Driver group B GroupB_Frequency = Multiplier factor * baseband			
0x8067	Pannel_BitFreqL	Baseband of Driver group A\B(1526HZ<baseband<14600Hz)			
0x8068	Pannel_BitFreqH				
0x8069	Pannel_Sensor_TimeL	Time interval of the neighbouring two driving signal (Unit: us), Reserved.			
0x806A	Pannel_Sensor_TimeH				
0x806B	Pannel_Tx_Gain	Reserved		Pannel_Drv_output_R 4 gears	Pannel_DAC_Gain 0:Gain maximum 7: Gain minimum
0x806C	Pannel_Rx_Gain	Pannel_PGA_C	Pannel_PGA_R	Pannel_Rx_Vcml(4gears)	Pannel_PGA_Gain (8 gears)
0x806D	Pannel_Dump_Shift	Reserved			Magnification coefficient of original value (The Nth power of 2)
0x806E	Drv_Frame_Control	Reserved	SubFrame_DrvNum		Repeat_Num
0x806F	NC	Reserved			
0x8070	NC	Reserved			
0x8071	NC	Reserved			
0x8072	Stylus_Tx_Gain	Undefined (invalid when stylus_priority=0)			
0x8073	Stylus_Rx_Gain	Undefined (invalid when stylus_priority=0)			
0x8074	Stylus_Dump_Shift	Magnification coefficient of original value (The Nth power of 2), Reserved			
0x8075	Stylus_Driver_Touch_Level	Stylus effective threshold (driving), Reserved			
0x8076	Stylus_Sensor_Touch_Level	Stylus effective threshold (driving), Reserved			
0x8077	Stylus_Control	Pen mode escape time out period (Unit: Sec)			
0x8078	Base_reduce	S-Style improve quantity		Reserved	
0x8079	NC	Reserved			
0x807A	Freq_Hopping_Start	Frequency hopping start frequency (Unit: 2KHz, 50 means 100KHz)			
0x807B	Freq_Hopping_End	Frequency hopping stop frequency (Unit: 2KHz, 150 means 300KHz)			
0x807C	Noise_Detect_Times	Detect_Station_Times	Detect_Confirm_Times		
0x807D	Hopping_Flag	Hopping_En	Reserved	Detect_Time_Out	

Addr	Name	Bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0	
0x807E	Hoppging_Threshold	Large_Noise_Threshold			Hopping_Hit_Threshold					
0x807F	Noise_Threshold	Threshold of noise level								
0x8080	NC	Reserved								
0x8081	NC	Reserved								
0x8082	Hopping_seg1_BitFreqL	Frequency hopping segment band 1 central frequency (for driver A/B)								
0x8083	Hopping_seg1_BitFreqH									
0x8084	Hopping_seg1_Factor	Frequency hopping segment 1 central frequency coefficient								
0x8085	Hopping_seg2_BitFreqL	Frequency hopping segment band 2 central frequency (for driver A/B)								
0x8086	Hopping_seg2_BitFreqH									
0x8087	Hopping_seg2_Factor	Frequency hopping segment 2 central frequency coefficient								
0x8088	Hopping_seg3_BitFreqL	Frequency hopping segment band 3 central frequency (for driver A/B)								
0x8089	Hopping_seg3_BitFreqH									
0x808A	Hopping_seg3_Factor	Frequency hopping segment 3 central frequency coefficient								
0x808B	Hopping_seg4_BitFreqL	Frequency hopping segment band 4 central frequency (for driver A/B)								
0x808C	Hopping_seg4_BitFreqH									
0x808D	Hopping_seg4_Factor	Frequency hopping segment 4 central frequency coefficient								
0x808E	Hopping_seg5_BitFreqL	Frequency hopping segment band 5 central frequency (for driver A/B)								
0x808F	Hopping_seg5_BitFreqH									
0x8090	Hopping_seg5_Factor	Frequency hopping segment 5 central frequency coefficient								
0x8091	NC	Reserved								
0x8092	NC	Reserved								
0x8093	Key 1	Key 1 Position: 0-255 valid (0 means no touch, it means independent touch key when 4 of the keys are 8 multiples)								
0x8094	Key 2	Key 2 position								
0x8095	Key 3	Key 3 position								
0x8096	Key 4	Key 4 position								
0x8097	Key_Area	Time limit for long press(1~16 s)				Touch valid interval setting: 0-15 valid				
0x8098	Key_Touch_Level	Key threshold of touch key								
0x8099	Key_Leave_Level	Key threshold of touch key								
0x809A	Key_Sens	KeySens_1(sensitivity coefficient of key 1, same below)				KeySens_2				
0x809B	Key_Sens	KeySens_3				KeySens_4				
0x809C	Key_Restrain	Finger from screen left after inhibition of key time(Unit:100ms,0 means 600ms)				The independent button pro key inhibition parameters				
0x809D	NC	Reserved								
0x809E	NC	Reserved								
0x809F	NC	Reserved								
0x80A0	NC	Reserved								
0x80A1	NC	Reserved								
0x80A2	Proximity_Drv_Select	Drv_Start_Ch (start channel of driving direction)				Drv_End_Ch (End channel)				

Addr	Name	Bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0	
0x807E	Hoppging_Threshold	Large_Noise_Threshold			Hopping_Hit_Threshold					
0x807F	Noise_Threshold	Threshold of noise level								
0x8080	NC	Reserved								
0x8081	NC	Reserved								
0x8082	Hopping_seg1_BitFreqL	Frequency hopping segment band 1 central frequency (for driver A/B)								
0x8083	Hopping_seg1_BitFreqH									
0x8084	Hopping_seg1_Factor	Frequency hopping segment 1 central frequency coefficient								
0x8085	Hopping_seg2_BitFreqL	Frequency hopping segment band 2 central frequency (for driver A/B)								
0x8086	Hopping_seg2_BitFreqH									
0x8087	Hopping_seg2_Factor	Frequency hopping segment 2 central frequency coefficient								
0x8088	Hopping_seg3_BitFreqL	Frequency hopping segment band 3 central frequency (for driver A/B)								
0x8089	Hopping_seg3_BitFreqH									
0x808A	Hopping_seg3_Factor	Frequency hopping segment 3 central frequency coefficient								
0x808B	Hopping_seg4_BitFreqL	Frequency hopping segment band 4 central frequency (for driver A/B)								
0x808C	Hopping_seg4_BitFreqH									
0x808D	Hopping_seg4_Factor	Frequency hopping segment 4 central frequency coefficient								
0x808E	Hopping_seg5_BitFreqL	Frequency hopping segment band 5 central frequency (for driver A/B)								
0x808F	Hopping_seg5_BitFreqH									
0x8090	Hopping_seg5_Factor	Frequency hopping segment 5 central frequency coefficient								
0x8091	NC	Reserved								
0x8092	NC	Reserved								
0x8093	Key 1	Key 1 Position: 0-255 valid (0 means no touch, it means independent touch key when 4 of the keys are 8 multiples)								
0x8094	Key 2	Key 2 position								
0x8095	Key 3	Key 3 position								
0x8096	Key 4	Key 4 position								
0x8097	Key_Area	Time limit for long press(1~16 s)				Touch valid interval setting: 0-15 valid				
0x8098	Key_Touch_Level	Key threshold of touch key								
0x8099	Key_Leave_Level	Key threshold of touch key								
0x809A	Key_Sens	KeySens_1(sensitivity coefficient of key 1, same below)				KeySens_2				
0x809B	Key_Sens	KeySens_3				KeySens_4				
0x809C	Key_Restrain	Finger from screen left after inhibition of key time(Unit:100ms,0 means 600ms)				The independent button pro key inhibition parameters				
0x809D	NC	Reserved								
0x809E	NC	Reserved								
0x809F	NC	Reserved								
0x80A0	NC	Reserved								
0x80A1	NC	Reserved								
0x80A2	Proximity_Drv_Select	Drv_Start_Ch (start channel of driving direction)				Drv_End_Ch (End channel)				

Addr	Access	Bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
0x8144	R	Firmware version (HEX.low byte)							
0x8145	R	Firmware version (HEX.high byte)							
0x8146	R	x coordinate resolution (low byte)							
0x8147	R	x coordinate resolution (high byte)							
0x8148	R	y coordinate resolution (low byte)							
0x8149	R	y coordinate resolution (high byte)							
0x814A	R	Vendor_id (current module option information)							
0x814B	R	Reserved							
0x814C	R	Reserved							
0x814D	R	Reserved							
0x814E	R/W	buffer status	large detect	Reserved		number of touch points			
0x814F	R	track id							
0x8150	R	point 1 x coordinate (low byte)							
0x8151	R	point 1 x coordinate (high byte)							
0x8152	R	point 1 y coordinate (low byte)							
0x8153	R	point 1 y coordinate (high byte)							
0x8154	R	Point 1 size (low byte)							
0x8155	R	point 1 size (high byte)							
0x8156	R	Reserved							
0x8157	R	track id							
0x8158	R	point 2 x coordinate (low byte)							
0x8159	R	point 2 x coordinate (high byte)							
0x815A	R	point 2 y coordinate (low byte)							
0x815B	R	point 2 y coordinate (high byte)							
0x815C	R	point 2 size (low byte)							
0x815D	R	point 2 size (high byte)							
0x815E	R	Reserved							
0x815F	R	track id							
0x8160	R	point 3 x coordinate (low byte)							
0x8161	R	point 3 x coordinate (high byte)							
0x8162	R	point 3 y coordinate (low byte)							
0x8163	R	point 3 y coordinate (high byte)							
0x8164	R	point 3 size (low byte)							
0x8165	R	point 3 size (high byte)							
0x8166	R	Reserved							
0x8167	R	track id							
0x8168	R	point 4 x coordinate (low byte)							
0x8169	R	point 4 x coordinate (high byte)							
0x816A	R	point 4 y coordinate (low byte)							
0x816B	R	point 4 y coordinate (high byte)							
0x816C	R	point 4 size (low byte)							
0x816D	R	point 4 size (high byte)							
0x816E	R	Reserved							
0x816F	R	track id							
0x8170	R	point 5 x coordinate (low byte)							
0x8171	R	point 5 x coordinate (high byte)							
0x8172	R	point 5 y coordinate (low byte)							
0x8173	R	point 5 y coordinate							
0x8174	R	point 5 size (low byte)							
0x8175	R	point 5 size (high byte)							
0x8176	R	Reserved							
0x8177	R	Reserved							

11. RELIABILITY TEST

ENVIRONMENTAL TEST				
NO.	ITEM	CONDITIONS	TIME PERIOD	REMARK
1	High Temperature Storage	70°C	96Hours	Note 1,4
2	Low Temperature Storage	-30°C	96Hours	Note 1,4
3	High Temperature Humidity Storage	60°C,90%RH	96Hours	Note 4
4	High Temperature Operation	(60°C)	TBDHours	Note 2,4
5	Low Temperature Operation	-20°C	96Hours	Note1,4
6	Temperature Cycle	(-20°C) ~ (60°C) (30min) (30min)	50CYCLE	Note 4

Note1 : Ta is the ambient temperature of samples.

Note2 : Ts is the temperature of panel's surface.

Note3 : In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

Note4 : Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

12. LCM INSPECTION STANDARD

Inspection specifications refer ONation Corporation LCM INSPECTION STANDARD Document.
Document Number : TBD

13. PACKAGE INFORMATION

LCM Model	LCM Qty. in the box	Inner Box Size (mm)	Weight	REMARK
OT070BGDDLT-H0	TBD	TBD	TBD	

14. PRECAUTIONS FOR USE

14.1 SAFETY

- (1) Do not swallow any liquid crystal, even if there is no proof that liquid crystal is poisonous.
- (2) If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
- (3) If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

14.2 STORAGE CONDITIONS

- (1) Store the panel or module in a dark place where the temperature is $23\pm 5^{\circ}\text{C}$ and the humidity is below $50\pm 20\% \text{RH}$.
- (2) Store in anti-static electricity container.
- (3) Store in clean environment, free from dust, active gas, and solvent.
- (4) Do not place the module near organics solvents or corrosive gases.
- (5) Do not crush, shake, or jolt the module.

14.3 HANDLING PRECAUTIONS

- (1) Avoid static electricity which can damage the CMOS LSI.
- (2) The polarizing plate of the display is very fragile. So, please handle it very carefully.
- (3) Do not give external shock.
- (4) Do not apply excessive force on the surface.
- (5) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the Surface of plate.
- (6) Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
- (7) Do not operate it above the absolute maximum rating.
- (8) Do not remove the panel or frame from the module.
- (9) When the module is assembled, it should be attached to the system firmly, Be careful not to twist and bend the module.
- (10) Wipe off water droplets or oil immediately . If you leave the droplets for a long time, staining and discoloration may occur.
- (11) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs or clothes, it must be washed away thoroughly with soap.

14.4 WARRANTY

- (1) Acceptance inspection period
The period is within one month after the arrival of contracted commodity at the buyer's factory site.
- (2) Applicable warrant period
The period is within 12 months since the date of shipping out under normal using and storage conditions.