

SPECIFICATIONS FOR LCD MODULE

CUSTOMER	
CUSTOMER PART NO.	
AMPIRE PART NO.	AM-1280800P2TZQW-T05H
APPROVED BY	
DATE	

- ☐ Approved For Specifications
☐ Approved For Specifications & Sample

APPROVED BY	CHECKED BY	ORGANIZED BY

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AMPIRE CO., LTD.

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RECORD OF REVISION

Revision Date	Page	Contents	Editor
2018/05/24	--	New Release	Raymond

1. Features

7 inch Amorphous-TFT-LCD (Thin Film Transistor Liquid Crystal Display) module. This module is composed of a 7" TFT-LCD panel and LED backlight and LED driving board.

(1) Construction: 7" a-Si TFT active matrix, White LED Backlight.

(2) Resolution (pixel): 1280(R.G.B) X800

(3) Number of the Colors : 16.7M colors (R , G , B 8 bit digital each)

(4) LCD type :SFT with Normally Black

(5) Projective Capacitive Touch

a. Interface : USB

b. Touch Controller: EXC3132

2. PHYSICAL SPECIFICATIONS

Item	Specifications	unit
LCD size	7 inch (Diagonal)	
Resolution	1280 x (RGB) x 800	dot
Dot pitch	0.117(H) x 0.117(V)	mm
Active area	149.76(W) x 93.6(H)	mm
Module size	162.3(W) x 107.9(H) x 13.43(D)	mm
Surface treatment(Up Polarizer)	HC	
Color arrangement	RGB-stripe	
Contrast Ratio	800:1	
Brightness	400	cd/m ²

Note 1: Viewing direction for best image quality is different from Gray Scale Inversion Direction, there is a 180 degree shift.

3. ABSOLUTE MAX. RATINGS

3.1 TFT Absolute Maximum Ratings

Item	Symbol	Values		UNIT	Note
		Min.	Max.		
Power voltage	VDD	-0.3	4.2	V	
	VCC	-0.3	14		
Operation temperature	TOP	-20	70	°C	
Storage temperature	TST	-30	80	°C	

4. ELECTRICAL CHARACTERISTICS

4-1 Typical Operation Conditions

Item		Symbol	Values			Unit	Remark
			MIN	TYP	MAX		
Power Voltage		V _{DD}	3.0	3.3	3.6	V	Note 1,2
Power Consumption		I _{DD}	--	150	--	mA	Note 1,2 VDD=3.3V
Logic Input Voltage	Input Voltage	V _{IN}	0	-	V _{DD}	V	
	Logic input high voltage	V _{TH}	0.7V _{DD}	-	V _{DD}	V	Note 3
	Logic input low voltage	V _{TL}	GND	-	0.3V _{DD}	V	Note 3

Note 1: Value for Power Board combined panel.

Note 2: V_{DD} setting should match the signals output voltage (refer to Note 3) of customer's system board.

Note 3: LVDS.

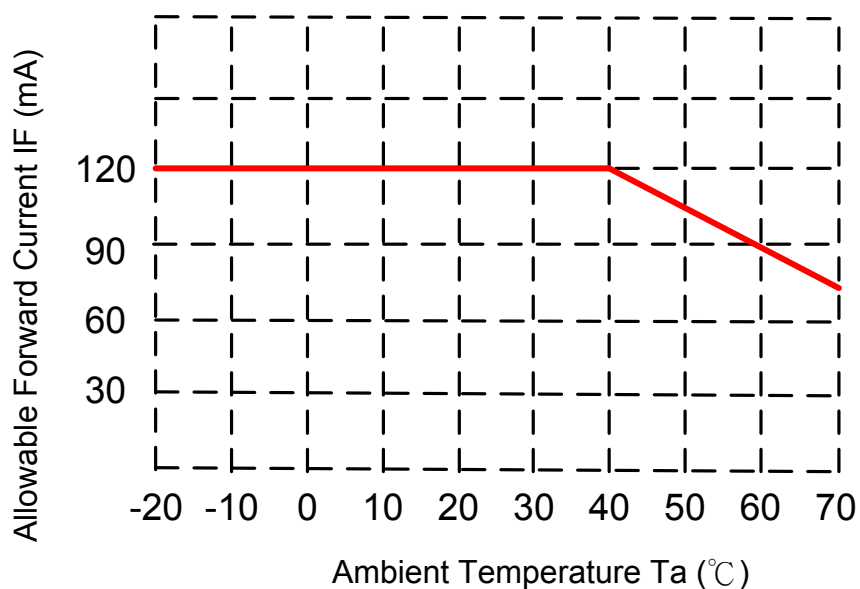
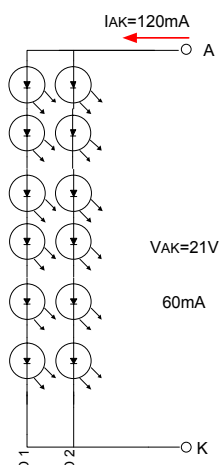
4-2 LED Driving Conditions

Item	Symbol	Values			Unit	Note
		Min.	Typ.	Max.		
LED Driver Power Voltage	V_{CC}	9	12	14	V	
LED Driver Current Consumption	I_{CC}	--	260	--	mA	$V_{CC}=12V$ $ADJ=5V$ (duty 100%)
ADJ Input Voltage	V_{ADJ}	1.2	3.3	3.6	V	duty=100% Note(3)
LED voltage	V_{AK}	--	21	--	V	Note(1)
LED forward Current	I_{AK}	--	120	--	mA	$T_a=25^{\circ}C$
LED life time	--	--	50,000	--	Hr	Note(2)

Note (1) The constant current source is needed for white LED back-light driving.

Note (2) Brightness to be decreased to 50% of the initial value. $T_a=25^{\circ}C$

Note (3) V_{LEDADJ} is PWM signal input. It is for brightness control.



4.3 Projective Capacitive Touch Panel :

4.3.1 Basic Characteristic

ITEM	SPECIFICATION
Type	Projective Capacitive Touch Panel
Activation	Max 10-fingers or Single-finger
X/Y Position Reporting	Absolute Position
Touch Force	No contact pressure required
Calibration	No need for calibration
Report Rate	Approx 80 points/sec
Control IC	EETI EXC3132
Interface	USB
Resolution	4096x4096

4.3.2 Electrical Absolute Max Rating

Item	Symbol	Values		UNIT	Note
		Min.	Max.		
Power Supply voltage	VDD	-0.3	5.5	V	GND =0V

4.3.3 ELECTRICAL CHARACTERISTICS

Specify the normal operating condition

(GND=0V)

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Power Supply Voltage	VDD	--	5.0	--	V	
Power Consumption	I _{VDD}		50		mA	

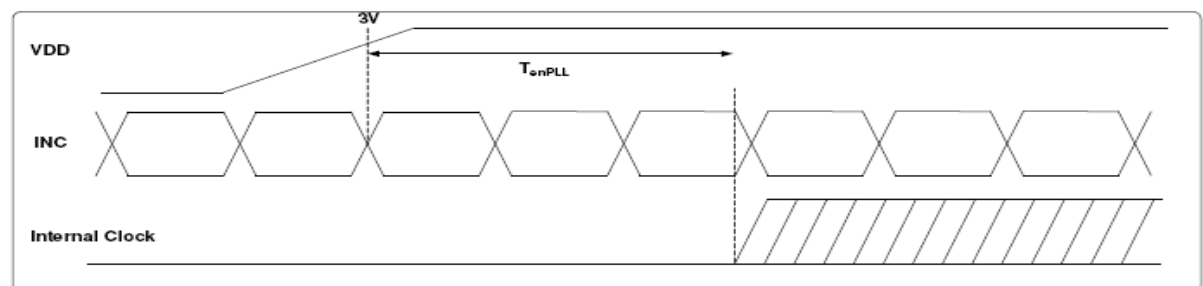
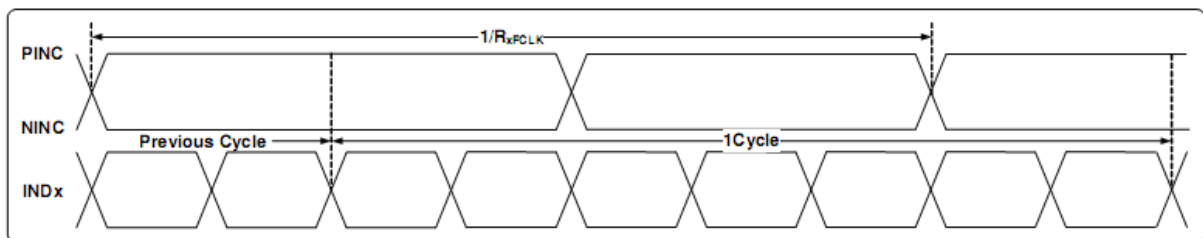
4.3.4 Interface

Pin	Name	Description
1	GND	Power GND
2	D-	USB Data-
3	D+	USB Data+
4	VDD	Power supply 5.0V
5	NC	No connection
6	NC	No connection

5. Timing Chart

5.1 AC Electrical Characteristics

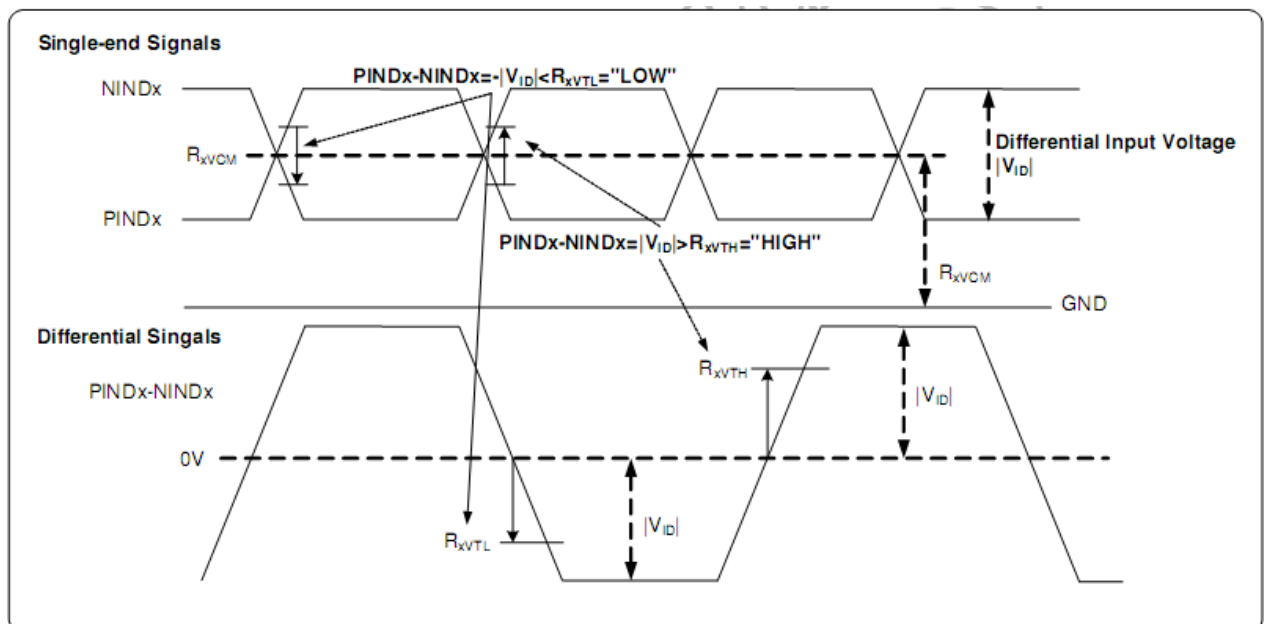
Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Clock Frequency	R_{xFCLK}	20	-	80	MHz	
Input data skew margin	T_{RSKM}	500	—	—	ps	$ V_{ID} = 400\text{mV}$, $R_{xVCM} = 1.2\text{V}$ $R_{xFCLK} = 80\text{MHz}$
Clock high time	T_{LVCH}	—	$4/(7 * R_{xFCLK})$	—	ns	
Clock low time	T_{LVCL}	—	$3/(7 * R_{xFCLK})$	—	ns	
PLL wake-up time	T_{enPLL}	—	—	150	us	



5.2 DC Electrical Characteristics

VDD=3.3V, AVDD=11V, AGND=GND=0V, Ta=25°C

Parameter	Symbol	Min	Typ	Max	Unit	Remark
Differential input high Threshold voltage	R_{XVTH}	–	–	+0.1	V	
Differential input Low Threshold voltage	R_{XVTL}	-0.1	–	–	V	
Input voltage range	R_{XVIN}	0	–	VDD-1.0	V	
Differential input common Mode voltage	R_{XVCM}	$ V_{ID} /2$	–	$2.4 - V_{ID} /2$	V	
Differential input voltage	$ V_{ID} $	0.2	–	0.6	V	
LVDS Digital Operating Current	R_{VXliz}	-10	–	+10	uA	
LVDS Digital Operating Current	I_{ddlvs}	–	(40)	(50)	mA	Fclk=65MHz, VDD=3.3V
LVDS Digital Stand-by Current	I_{stlvs}	–	(10)	(50)	uA	Clock & all functions are stopped



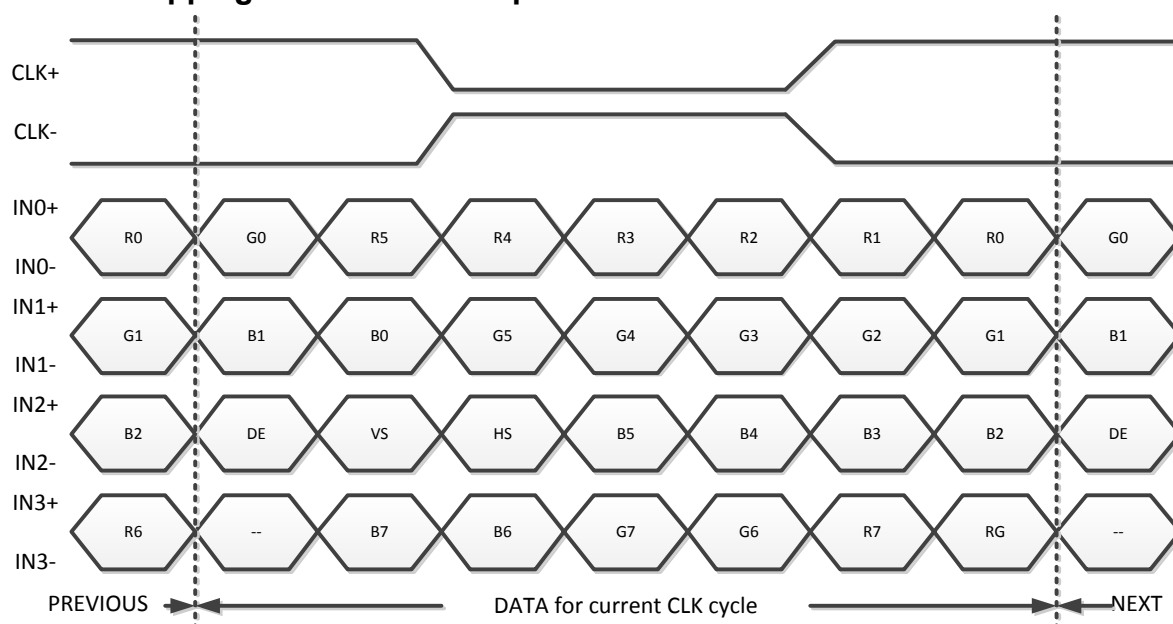
5.3 Input timing

1280x800 (RES[3:0] = 0010)

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
CLK frequency	t_{CLK}	62.6	68.2	78.1	Mhz	
Horizontal blanking time	t_{HBT}	20	69	164	t_{CLK}	$t_{HBP} + t_{HFP}$
Horizontal back porch	t_{HBP}	5	5	$164 - t_{HFP}$	t_{CLK}	
Horizontal display area	t_{HD}	1280	1280	1280	t_{CLK}	
Horizontal front porch	t_{HFP}	15	64	159	t_{CLK}	
Horizontal period	t_H	1300	1349	1444	t_{CLK}	
Horizontal pulse width	t_{HPW}	1	1	256	t_{CLK}	
Vertical blanking time	t_{VBT}	5	42	101	t_H	$t_{VBP} + t_{VFP}$
Vertical back porch	t_{VBP}	2	2	$101 - t_{VFP}$	t_H	
Vertical display area	t_{VD}	800	800	800	t_H	
Vertical front porch	t_{VFP}	3	40	99	t_H	
Vertical period	t_V	803	842	901	t_H	
Vertical pulse width	t_{VPW}	1	1	128	t_H	

5.3 Data Input Format

Vesa data mapping : 24-BIT LVDS Input Data Format



Note : R/G/B data 7 : MSB, R/G/B data 0 : LSB

Signal Name	Description	Remark
R7 R6 R5 R4 R3 R2 R1 R0	Red Data 7 (MSB) Red Data 6 Red Data 5 Red Data 4 Red Data 3 Red Data 2 Red Data 1 Red Data 0 (LSB)	Red-pixel Data Each red pixel's brightness data consists of these 8 bits pixel data.
G7 G6 G5 G4 G3 G2 G1 G0	Green Date 7 (MSB) Green Date 6 Green Date 5 Green Date 4 Green Date 3 Green Date 2 Green Date 1 Green Date 0 (LSB)	Green-pixel Data Each green pixel's brightness data consists of these 8 bits pixel data.
B7 B6 B5 B4 B3 B2 B1 B0	Blue Data 7 (MSB) Blue Data 6 Blue Data 5 Blue Data 4 Blue Data 3 Blue Data 2 Blue Data 1 Blue Data 0 (LSB)	Blue-pixel Data Each blue pixel's brightness data consists of these 8 bits pixel data.
RxCLKIN+ RxCLKIN-	LVDS Clock Input	
DE	Display Enable	
VS	Vertical Sync Signal	
HS	Horizontal Sync Signal	

6. Optical Specifications

6.1 TFT Optical Characteristics

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≥10	70	80	-	Degree	Note 2
		θB		70	80	-		
		θL		70	80	-		
		θR		70	80	-		
Contrast Ratio		CR	θ=0°	600	800	-		Left/right 0° Top/bottom 5°
Response Time		T _{ON}	25℃	-	35	40	ms	Note1 Note4
		T _{OFF}						
Chromaticity	White	x		0.256	0.306	0.356		Note1 Note5
		y		0.279	0.329	0.379		
	Red	x		0.520	0.570	0.620		
		y		0.280	0.330	0.380		
	Green	x		0.300	0.350	0.400		
		y		0.542	0.592	0.642		
	Blue	x		0.105	0.155	0.205		
		y		0.051	0.101	0.151		
Uniformity		U		70	75	-	%	Note1、Note6
NTSC				45	50	-	%	
Luminance		L		320	400	-	cd/m²	Note7

Test Conditions:

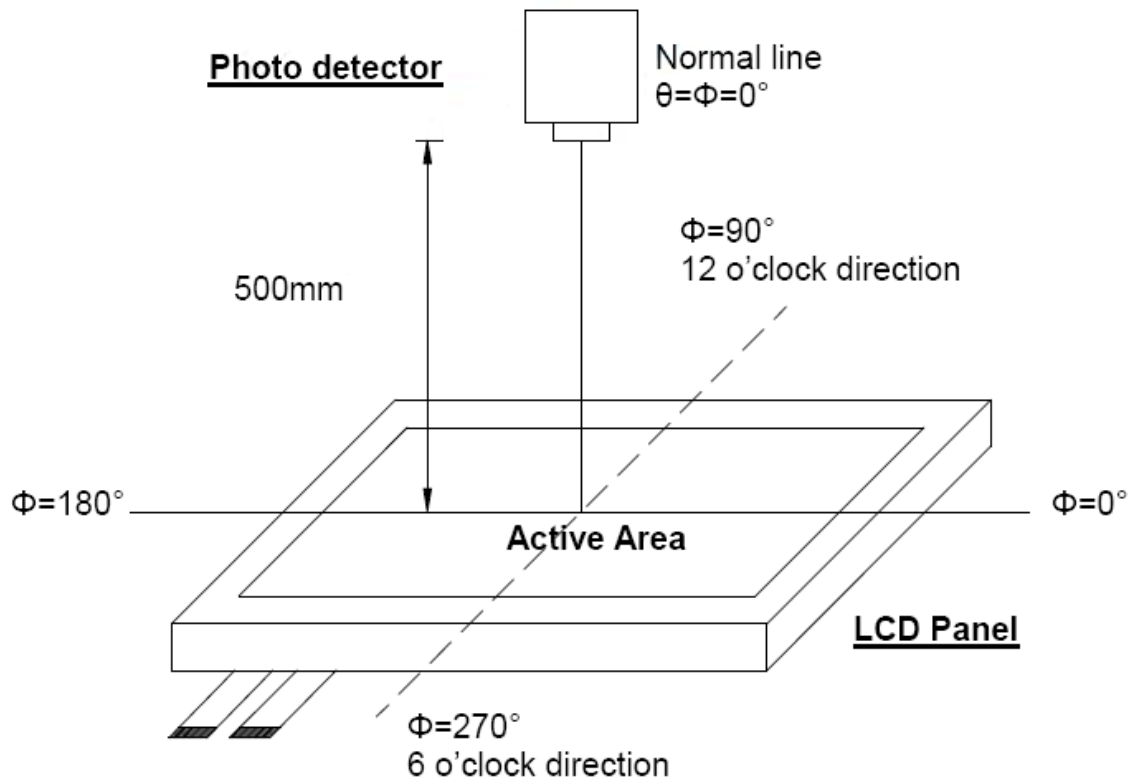
1. $I_F = 120mA$, the ambient temperature is $25^\circ C$.
2. The test systems refer to Note 1 and Note2.

Note 1: Definition of optical measurement system.

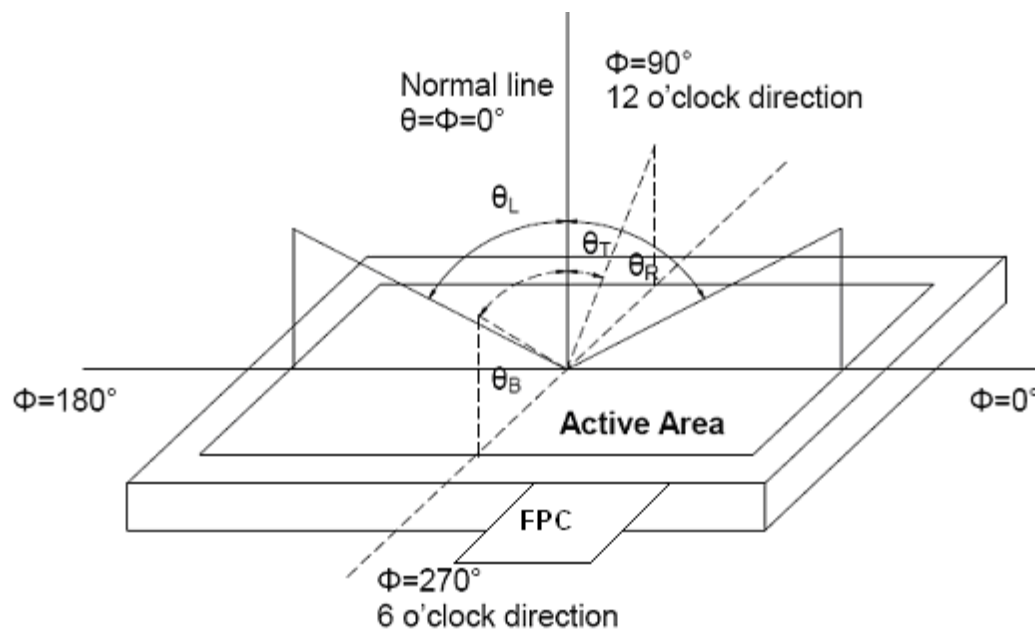
The optical characteristics should be measured in dark room. After 10 Minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.

Note 1 : Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen.
(Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/Field of view : 1° / Height : 500mm.)

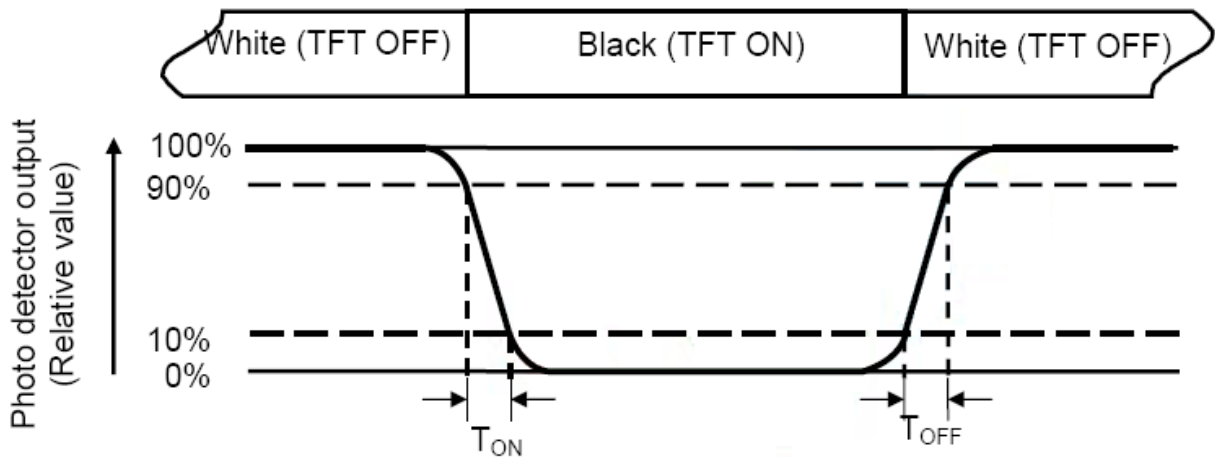


Note 2 : Definition of viewing angle range



Note 3 : Definition of Response time

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.



Note 4 : Definition of contrast ratio

$$\text{Contrast Ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 5 : Definition of color chromaticity (CIE1931)

Color coordinated measured at center point of LCD.

Note 6 : All input terminals LCD panel must be ground when measuring the center area of the panel.

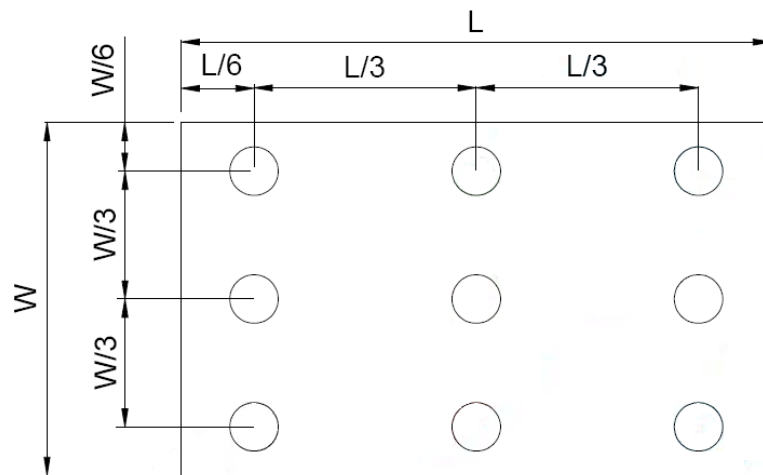
Note 7 : Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer to bellow figure). Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity}(Y_u) = \frac{B_{min}}{B_{max}}$$

L ----- Active area length

W ----- Active area width



B_{\max} : The measured maximum luminance of all measurement position.

B_{\min} : The measured minimum luminance of all measurement position.

6. INTERFACE

CN2 LVDS connector: P1.0 20pin/CP100-S20G-H16

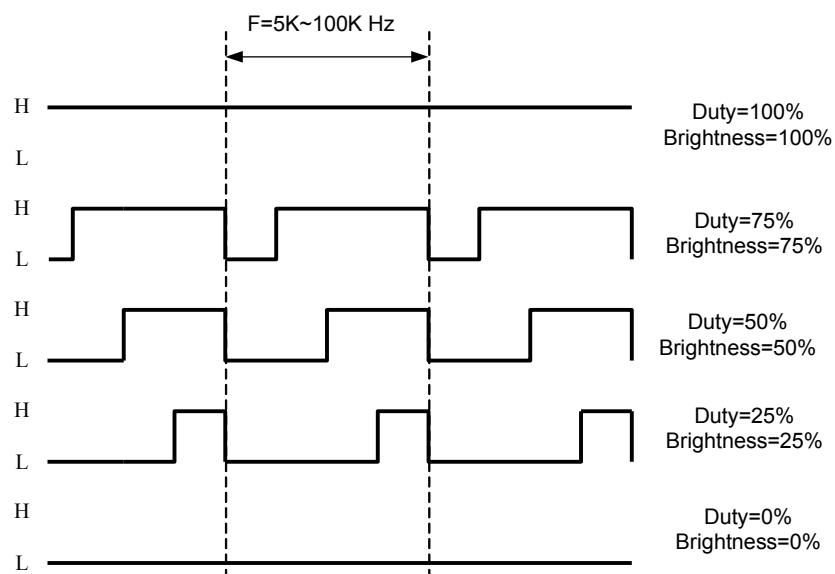
Pin No.	Symbol	I/O	Description	Note
1	VDD	P	Power Voltage for Logic: 3.3V	
2	VDD	P	Power Voltage for Logic: 3.3V	
3	GND	P	Ground	
4	GND	P	Ground	
5	IN0-	I	- LVDS differential data input	
6	IN0+	I	+ LVDS differential data input	
7	GND	P	Ground	
8	IN1-	I	- LVDS differential data input	
9	IN1+	I	+ LVDS differential data input	
10	GND	P	Ground	
11	IN2-	I	- LVDS differential data input	
12	IN2+	I	+ LVDS differential data input	
13	GND	P	Ground	
14	CLK-	I	- LVDS differential data input	
15	CLK+	I	+ LVDS differential data input	
16	GND	P	Ground	
17	IN3-	I	- LVDS differential data input	
18	IN3+	I	+ LVDS differential data input	
19	GND	P	Ground	
20	GND	P	Ground	

CN3 LED connector: ENTERY 3808K-F05N-03L

Pin No.	Symbol	I/O	Description	Note
1	VCC	P	Power Voltage for Backlight: 12V	
2	GND	P	Power Ground	
3	ON/OFF	I	Backlight ON/OFF, "H" LED ON.	
4	Dimming	I	PWM Adjust the LED brightness	
5	NA	-	No Connection	

NOTE : Pin4: Dimming is PWM signal input. It is for brightness control.

ITEM	SYMBOL	MIN	TYP	MAX	UNIT
ADJ(Dimming)signal frequency	f_{PWM}	5	--	100	KHz
ADJ signal logic level High	V_{IH}	1.2	3.3	3.6	V
ADJ signal logic level Low	V_{IL}	0	--	0.8	V



7. RELIABILITY TEST CONDITIONS

Test Item	Test Conditions	Note
High Temperature Operation	70±3°C , t=240 hrs	
Low Temperature Operation	-20±3°C , t=240 hrs	
High Temperature Storage	80±3°C , t=240 hrs	1,2
Low Temperature Storage	-30±3°C , t=240 hrs	1,2
Thermal Shock Test	-10°C ~ 60°C 30 min. ~ 30 min. (1 cycle) Total 100cycle	1,2
Storage Humidity Test	60 °C, Humidity 90%, 240 hrs	1,2
Vibration Test (Packing)	Sweep frequency : 10 ~ 50 ~ 10 Hz/1min Amplitude : 0.75mm Test direction : X.Y.Z/3 axis Duration : 30min/each axis	2

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

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

Note 3: The module shouldn't be tested more than one condition, and all the test conditions are independent.

Note 4: All the reliability tests should be done without protective film on the module.

Definitions of life end point:

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

8. General Precautions

8.1 Handling Precautions

8.1.1 Display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

8.1.2 If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

8.1.3 Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

8.1.4 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

8.1.5 If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

- Isopropyl alcohol
- Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

- Water
- Ketone
- Aromatic solvents

8.1.6 Do not attempt to disassemble the LCD Module.

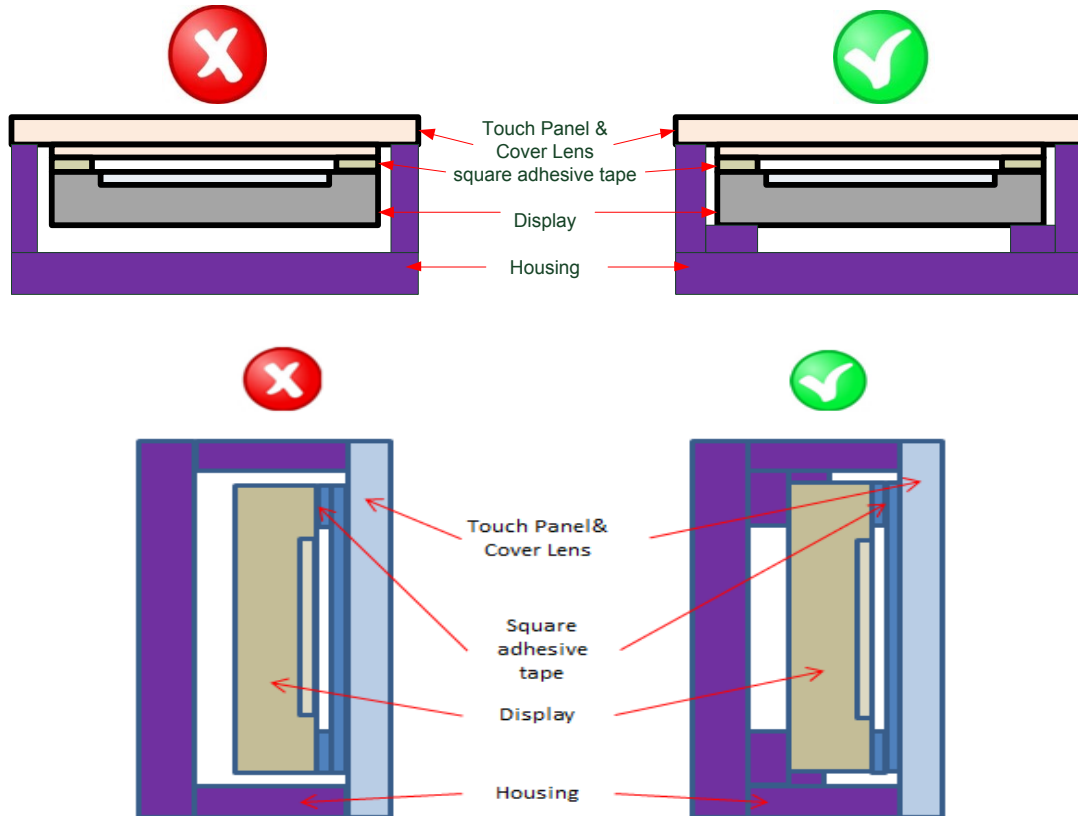
8.1.7 If the logic circuit power is off, do not apply the input signals.

8.1.8 To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

- a. Be sure to ground the body when handling the LCD Modules.
- b. Tools required for assembly, such as soldering irons, must be properly ground.
- c. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.
- d. The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

8.2 Mechanism precautions

The square adhesive tape which is between the touch panel and display can't provide well supporting in the long term and high ambient temperature condition. Whether upright or horizontal position the support holder which is in the back side of the display is needed. Do not let the display floating.



8.3 Storage precautions

8.3.1 When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

8.3.2 The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:

Temperature : $0^{\circ}\text{C} \sim 40^{\circ}\text{C}$

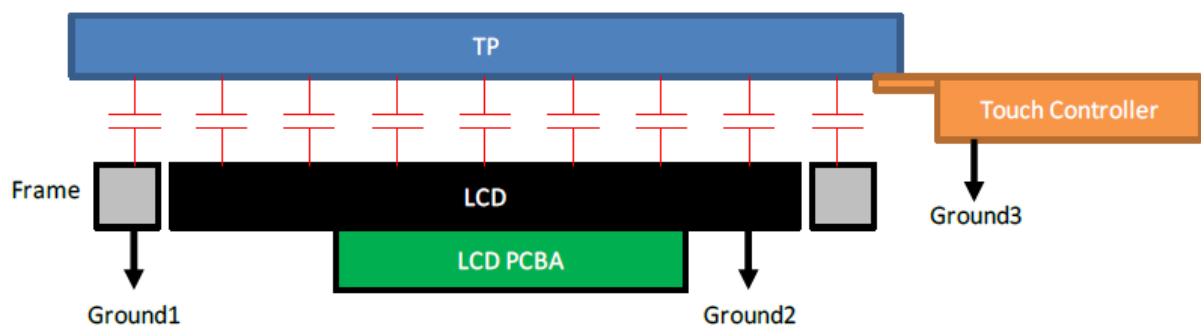
Relatively humidity: $\leq 80\%$

8.3.3 The LCD modules should be stored in the room without acid, alkali and harmful gas.

8.4 General Precautions

8.4.1 Do not keep the LCD at the same display pattern continually. The residual image will happen and it will damage the LCD. Please use screen saver.

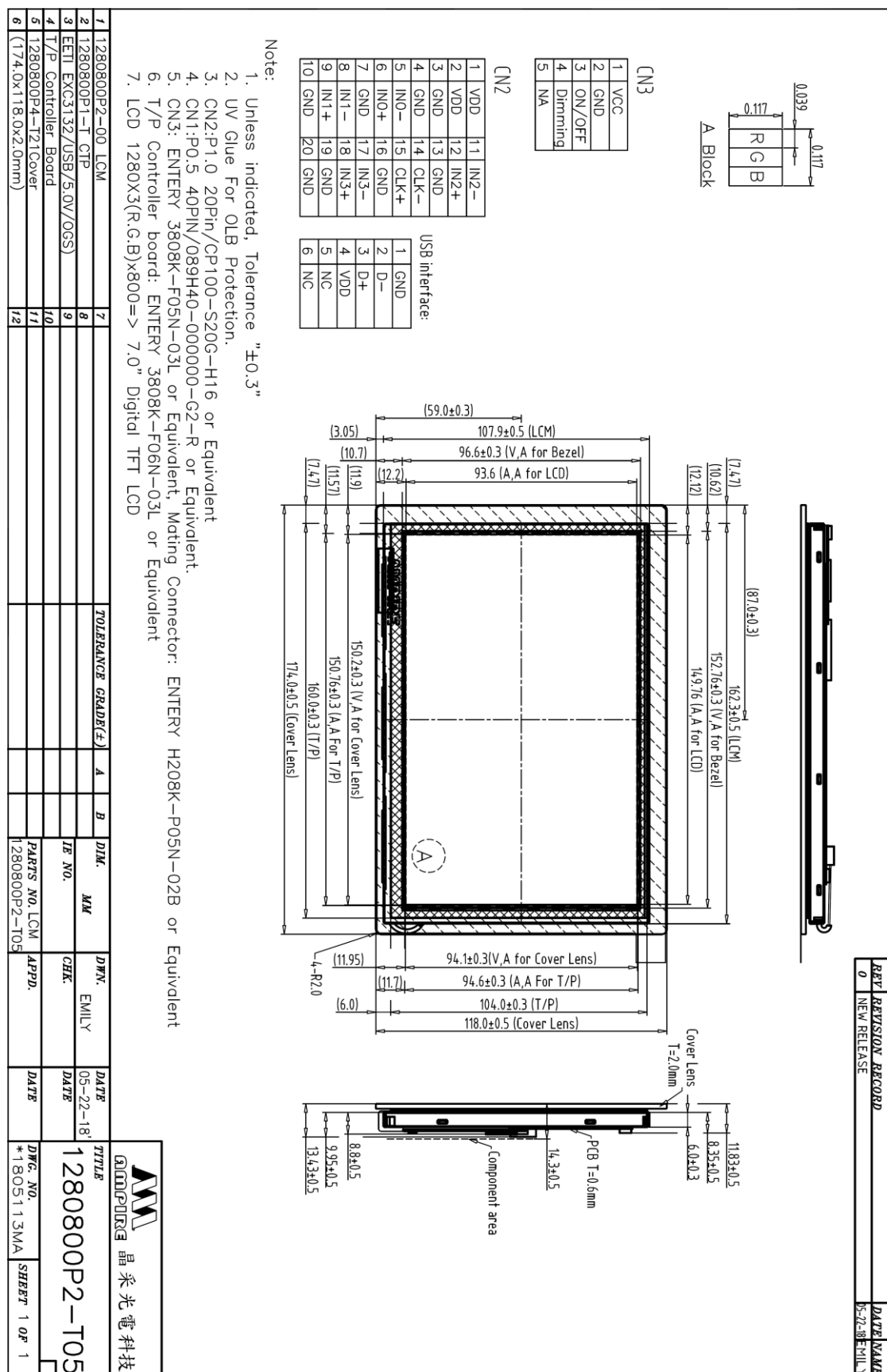
8.4.2 TP needs to work in environment with stable stray capacitance. In order to minimize the variation in stray capacitance, all conductive mechanical parts must not be floating. Intermittent floating any conductive part around the touch sensor may cause significant stray capacitance change and abnormal touch function. It is recommended to keep all conductive parts having same electrical potential as the GND of the touch controller module.

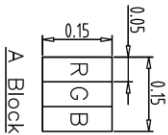


GND1, GND2 and GND3 should be connected together to have the same ground

8.4.3 The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.

9. OUTLINE DIMENSION

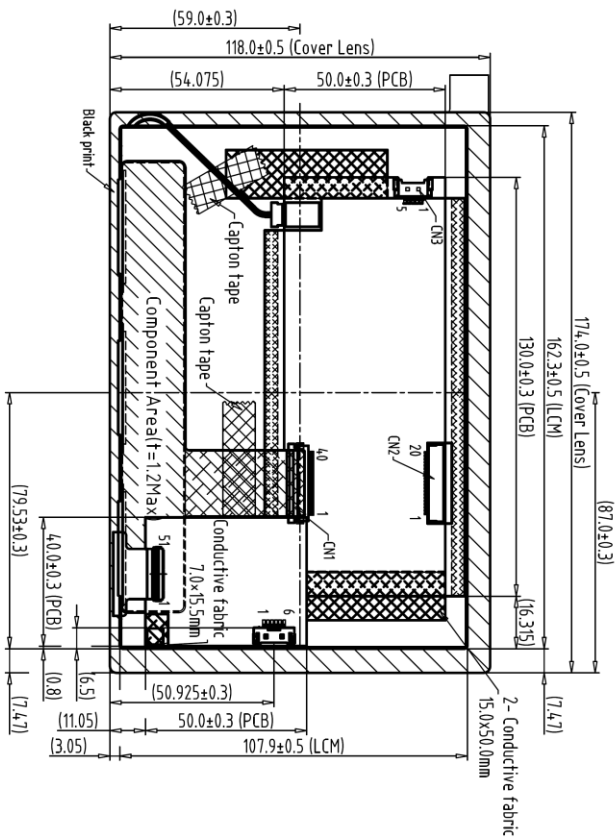




1	VCC
2	GND
3	ON/OFF
4	Dimming
5	NA

1	VDD	11	IN2-
2	VDD	12	IN2+
3	GND	13	GND
4	GND	14	CLK-
5	IN0-	15	CLK+
6	IN0+	16	GND
7	GND	17	IN3-
8	IN1-	18	IN3+
9	IN1+	19	GND
10	GND	20	GND

1	GND
2	D-
3	D+
4	VDD
5	NC
6	NC



- Note:
1. Unless indicated, Tolerance "±0.3"
 2. UV Glue For OLB Protection.

Back view

3. CN2:P1.0 20Pin/CP100-S20G-H16 or Equivalent
4. CN1:P0.5 40Pin/089H40-000000-G2-R or Equivalent.
5. CN3: ENTERY 3808K-F05N-03L or Equivalent, Mating Connector: ENTERY H208K-P05N-02B or Equivalent
6. T/P Controller board: ENTERY 3808K-F06N-03L or Equivalent
7. LCD 1280X3(R.G.B)X800=> 7.0" Digital TFT LCD

1	1280800P2-00 LCM	7		TOLERANCE GRADE(±)	A	B	DM.	MM	DM.	EMILY	DATE	TITLE	DMC. NO.	SHEET
2	1280800P1-T CTP	8									05-22-18	1280800P2-T05	*1805114MA	1 of 1
3	EET EXC3132/USB/5.0V/OGS)	9					IE NO.		CHK.		DATE			
4	T/P Controller Board	10												
5	1280800P4-T21Cover	11					PARTS NO.LCM-1	APPD.			DATE			
6	(174.0x118.0x2.0mm)	12					1280800P2-T05							