Topway Display HMT068BTA-C LCD Module User Manual

Topway Display HMT068BTA-C LCD Module

Rev.	Descriptions	Release Date
0.1	-Preliminary release	2018-06-08
0.2	-Update section 3.1	2018-07-12
0.3	-Add Highlight Description	2020-12-30
0.4	0.4 -Update Section 1.1	2022-04-15

Contents

Basic Specificati

TOPWAY HMT068BTA-C is a Smart TFT Module with 32bit MCU on board. Its graphics engine provides numbers of outstanding features.
It supports TOPWAY TML 3.0 for preload and pre design display interface that simplify the host operation and development time. Suitable for industry control, instrumentation, medical electronics, power electric equipment applications.

General Specification

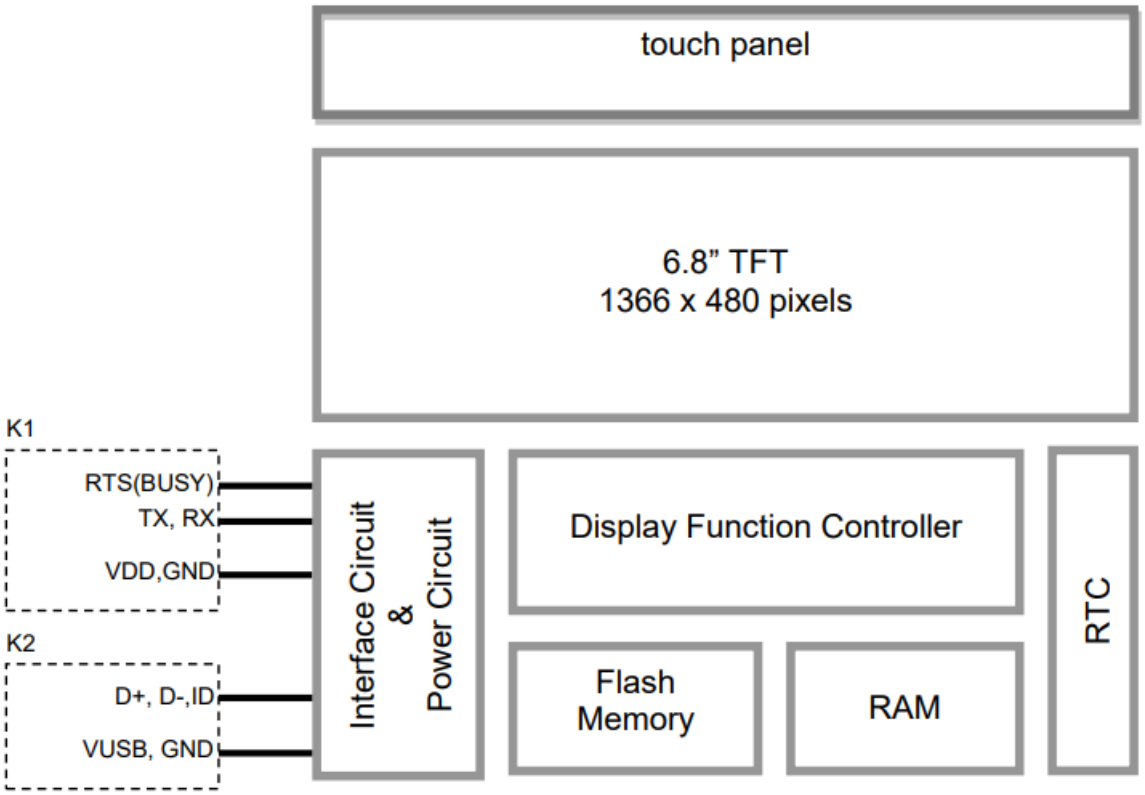
Screen Size(Diagonal) : 6.8”
Resolution : 1366(RGB) x 480
Color Depth : 65k color (16bit)
Pixel Configuration : RGB Stripe
Display Mode : Transmissive / Normal Black
Viewing Direction : 6H (*1) (gray-scale inverse) 12H (*2)
Outline Dimension : 195.0 x 69.6 x 17.6 (mm) (see attached drawing for details)
Active Area : 163.92 x 55.44(mm)
Backlight : LED
Surface Treatment : Anti-Glare Treatment
Operating Temperature : -20 ~ +70°C
Storage Temperature : -30 ~ +80°C
Highlight RTC without battery, Support 90 degrees rotation, Lua script engine, Buzzer

Note:

1. *For saturated color display content **(eg. pure-red, pure-green, pure-blue, or pure-colors-combinations)**.
2. *For “color scales” display content.

3. *Color tone may slightly change by Temperature and Driving Condition.

Block Diagram



Terminal Function

UART Interface Terminal (K1)

Pin No	Pin Name	I/O	Descriptions
1,2	VDD	P	Power supply
3	RTS(BUSY)	O	Request To Send (funct ion as busy BUSY signa l) 1 Busy 0 No busy
4	TX	O	Data output
5,6	RX	I	Data Input
7,8	GND	P	Ground, (0V)

Note.

1. *User data and commands transfer through this terminal
2. *HW hand shake is suggested

USB Interface Terminal (K2)

Pin No.	Pin Name	I/O	Descriptions
1	VUSB	P	Power supply
2	D-	I/O	USB DATA negative signal
3	D+	I/O	USB DATA positive signal
4	ID	I	USB_ID,1:Client,0:HOST
5	GND	P	Ground, (0V)

Note.

1. *TML files and image files preload through this terminal.
2. *Do NOT connect USB terminal ,while VDD(K1) is present.

Absolute Maximum Ratings

Items	Symbol	Min.	Max.	Unit	Condensation
Power Supply voltage	V_{DD}	-0.3	28	V	
Operating Temperature	T_{OP}	-20	70	°C	No Condensation

Electrical Characteristics

DC Characteristics

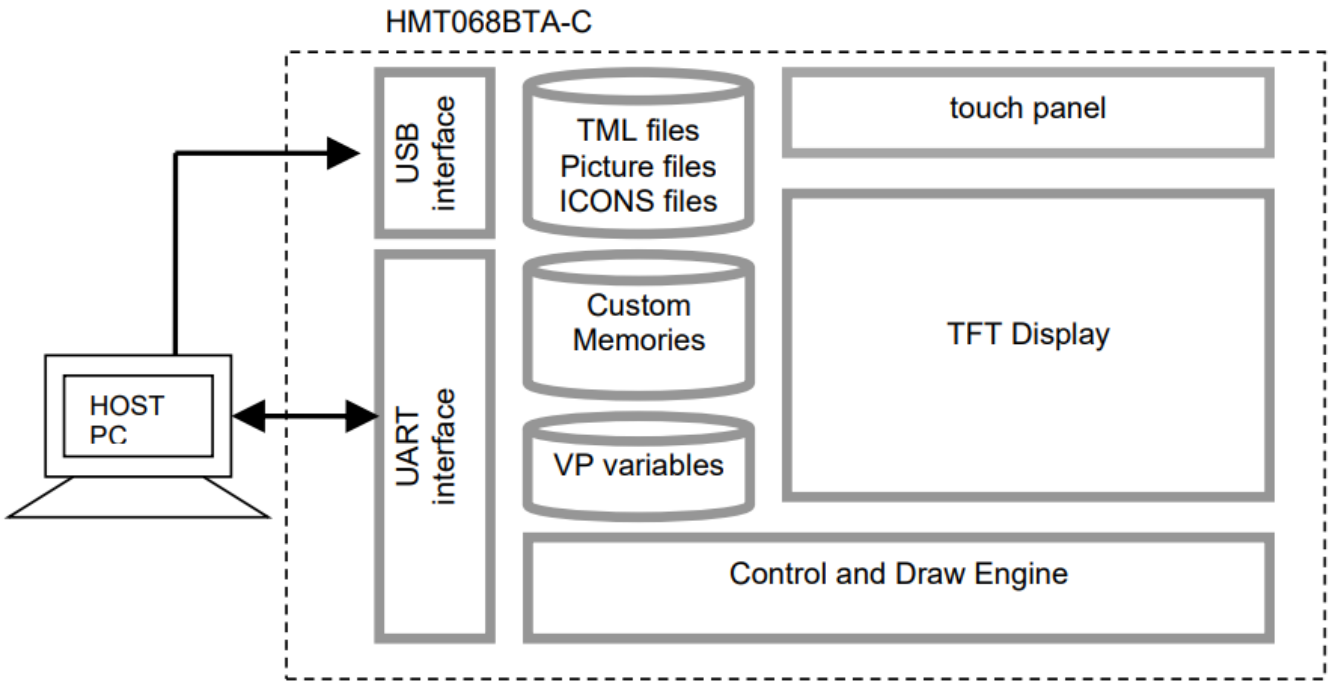
VDD=12V,GND=0V, TOP =25°C

Items	Symbol	MIN.	TYP.	MAX	Unit	Applicable Pin
Operating Voltage	VDD	6	12.0	26	V	VDD
RxD Input MARK(1)	VR_{xDM}	-3.0	–	-15.0	V	Rx
RxD Input SPACE(0)	V_{RXDS}	+3.0	–	+15.0	V	Rx
TxD Output MARK(1)	V_{TXDM}	-3.0	–	-15.0	V	Tx
TxD Output SPACE(0)	V_{TXDS}	+3.0	–	+15.0	V	Tx
RTS Output High	V_{TXDH}	-3.0	–	-15.0	V	RTS(BUSY)
RTS Output Low	V_{TXDL}	+3.0	–	+15.0	V	RTS(BUSY)
Operating Current	I_{DD}	–	330	–	mA	VDD (*1)
Battery Supply Current	I_{BAT}	–	0.6	–	uA	

Note.
*1. Normal display condition and no usb connect.

Function Specifications

Basic Operation Function Desc



TML files, Picture files, ICON files are stored inside FLASH memory area.

They are preloaded to HMT068BTA-C for stand alone interface use.

- Those files are preloaded via USB interface as an USB drive.
- All the interface flow and the touch response are based on the preloaded TML files
- VP variables memory is inside RAM area, it provides real time access via UART by the HOST or display onto the TFT by TML file.
- Custom Memories are inside FLASH memory area It can be accessed via UART interface by the HOST.
- Control and Draw Engine executes HOST commands and response respectively
- It also reports the real time Touch Key number to the HOST

Memory Space Allocation

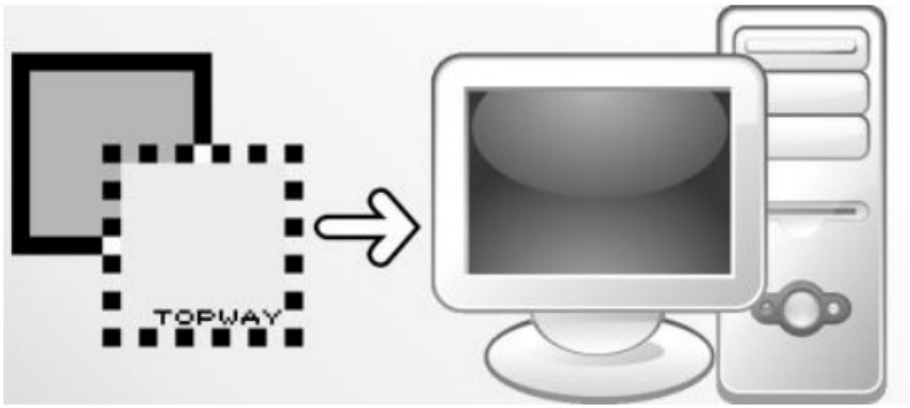
Function	Name	Memory sapce	Unit size
128byte string	VP_STR	128k byte	128 byte
16bit number (*1)	VP_N16	64k byte	2 byte
32bit number (*1)	VP_N32	64k byte	4 byte
64bit number (*1)	VP_N64	64k byte	8 byte
16bit Graph data array (*1)	VP_G16	128k byte	Dynamic
Bit-map data	VP_BP1	128k byte	Dynamic
Customer Flash	Cust_Flash	256k byte	1 byte
USR BIN	USR_bin	256k byte	1 byte

Note.

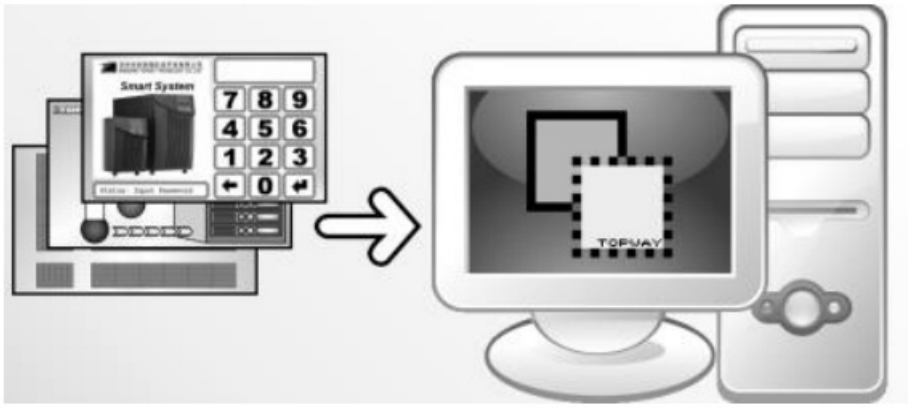
1. *Signed integer number

Quick Start Guide

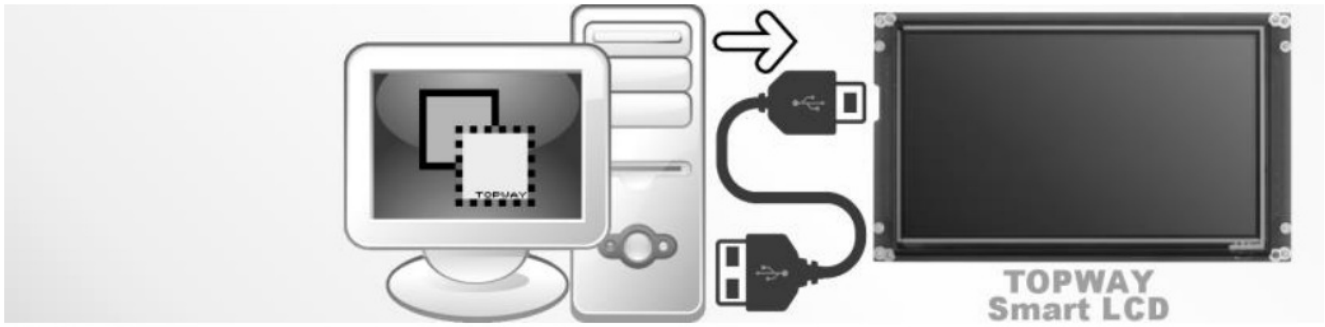
1. Install TOPWAY Graphics Editor



2. Import pictures design UI flow



3. Download to Smart LCD



4. power on & display

5. Connect to host Show real time data

Command Descriptions

Please refer to “SMART LCD Command Manual” .

Optical Characteristics

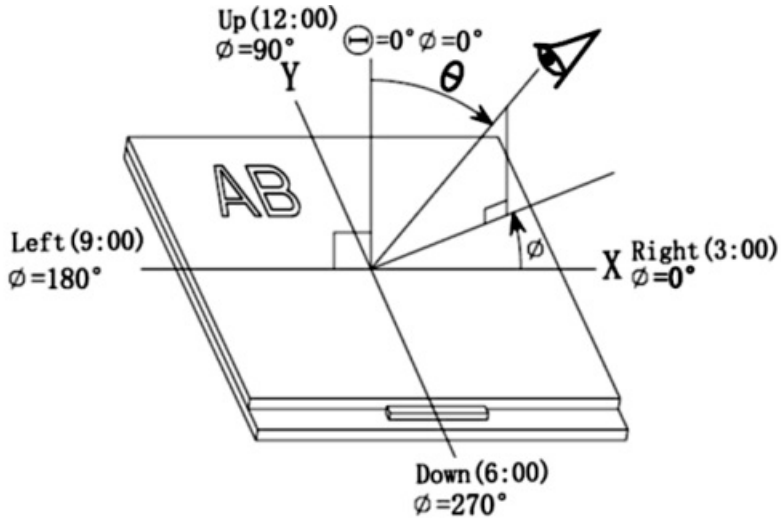
Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	40	50	–	Degree	Note2,3
		θB		60	70	–		
		θL		60	70	–		
		θR		60	70	–		
Contrast Ratio		CR	θ=0°	400	500	–		Note 3
Response Time		TON	25℃	–	20	50	ms	Note 4
		TOFF						
Chromaticity	White	X	Backlight is on	0.258	0.308	0.358		Note 1,5
		Y		0.275	0.325	0.375		
	Red	X		0.544	0.594	0.644		Note 1,5
		Y		0.279	0.329	0.378		
	Green	X		0.304	0.354	0.404		Note 1,5
		Y		0.518	0.568	0.618		
	Blue	X		0.101	0.151	0.201		Note 1,5
		y		0.054	0.104	0.154		
Uniformity	U			70	75	–	%	Note 6
NTSC				45	50	–	%	Note 5
Luminance	L			–	400	–	cd/	Note 7

1. IF= 200 mA,and the ambient temperature is 25℃.
2. The test systems refer to Note 1 and Note 2.

Note 1:
The data are measured after LEDs are turned on for 5 minutes.
LCM displays full white. The brightness is the average value of 9 measured spots.
Measurement equipment SR-3A **(1°)** Measuring condition.

- **Measuring surroundings:** Dark room
- **Measuring temperature:** Ta=25℃.
- Adjust operating voltage to get optimum contrast at the center of the display.

Note 2:
The definition of viewing angle:
Refer to the graph below marked by θ and Φ

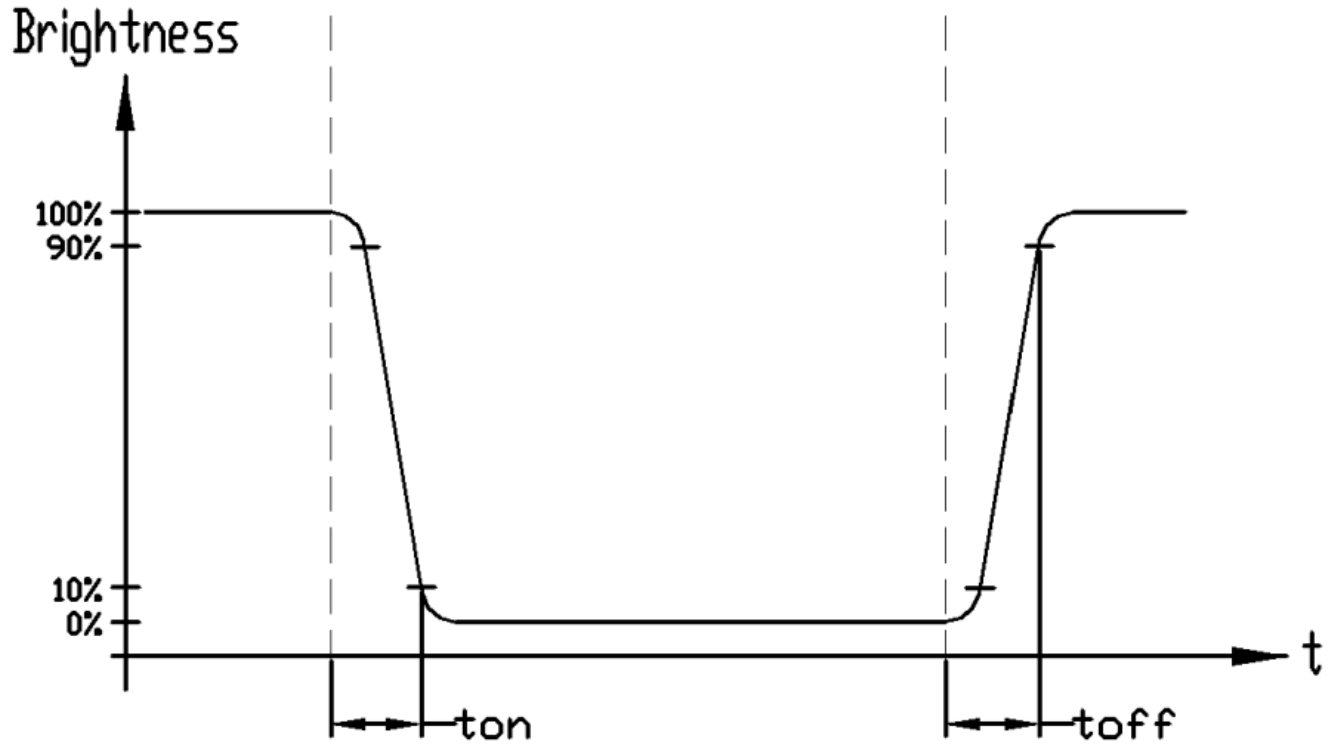


Note 3:
The definition of contrast ratio (Test LCM using SR-3A (1°))

$$\text{Contrast Ratio(CR)} = \frac{\text{Luminance When LCD is at "White" state}}{\text{Luminance When LCD is at "Black" state}}$$

(Contrast Ratio is measured in optimum common electrode voltage)

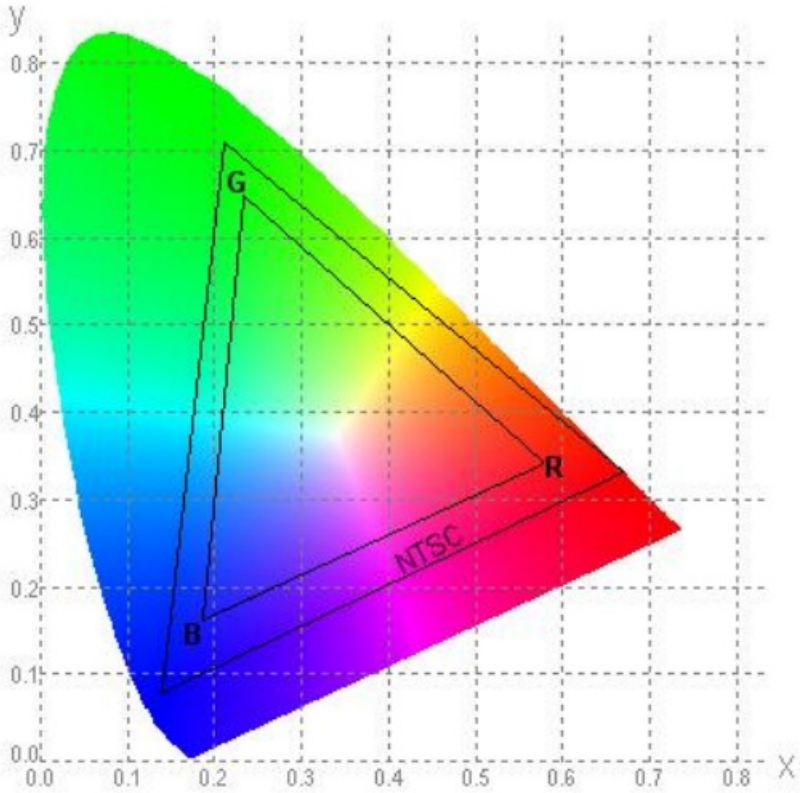
Note 4:
Definition of Response time. (Test LCD using BM-7A(2°)): The output signals of photo detector are measured when the input signals are changed from "black" to "white"(falling time)
and from "white" to "black"(rising time), respectively.
The response time is defined as the time interval between the 10% and 90% of amplitudes.Refer to figure as below.



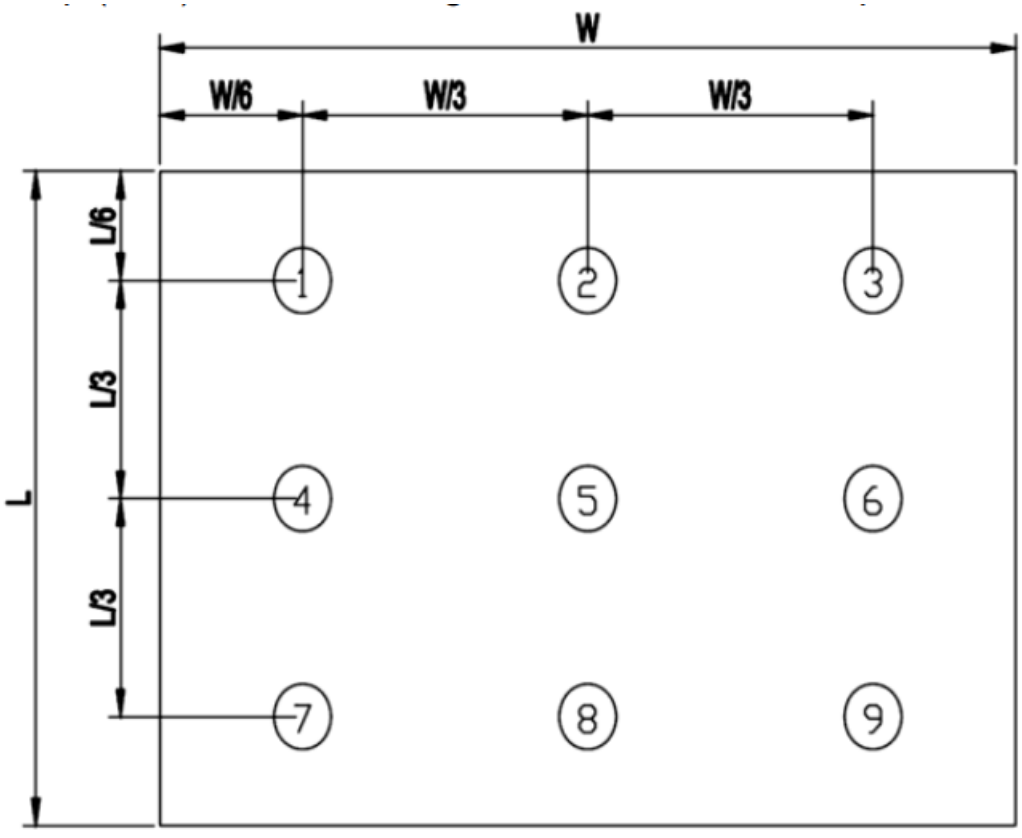
Note 5:
Definition of Color of CIE1931 Coordinate and NTSC Ratio

Color gamut:

$$S = \frac{\text{Area of RGB triangle}}{\text{Area of NTSC triangle}} \times 100\%$$



Note 6:
The luminance uniformity is calculated by using following formula.
△**Bp** = Bp (Min.) / Bp (Max.)×100 (%)
Bp (Max.) = Maximum brightness in 9 measured spots
Bp (Min.) = Minimum brightness in 9 measured spots.



Note 7:

Measured the luminance of white state at center point

LCD Module Design and Handling Preca

- Please ensure V0, VCOM is adjustable, to enable LCD module get the best contrast ratio under different temperatures, view angles and positions.
- Normally display quality should be judged under the best contrast ratio within viewable area. Unexpected display pattern may com out under abnormal contrast ratio.
- Never operate the LCD module exceed the absolute maximum ratings.
- Never apply signal to the LCD module without power supply.
- Keep signal line as short as possible to reduce external noise interference.
- IC chip (e.g. TAB or COG) is sensitive to light. Strong light might cause malfunction. Light sealing structure casing is recommended.
- Make sure there is enough space (with cushion) between case and LCD panel, to prevent external force passed on to the panel; otherwise that may cause damage to the LCD and degrade its display result.
- Avoid showing a display pattern on screen for a long time (continuous ON segment).
- LCD module reliability may be reduced by temperature shock.
- When storing and operating LCD module, avoids exposure to direct sunlight, high humidity, high or low temperature. They may damage or degrade the LCD module.
- Never leave LCD module in extreme condition (max./min storage/operate temperature) for more than 48hr.
- Recommend LCD module storage conditions is 0 C~40 C <80%RH.
- LCD module should be stored in the room without acid, alkali and harmful gas.
- Avoid dropping & violent shocking during transportation, and no excessive pressure press, moisture and sunlight.
- LCD module can be easily damaged by static electricity. Please maintain an optimum anti-static working environment to protect the LCD module. (eg. ground the soldering irons properly)
- Be sure to ground the body when handling LCD module.
- Only hold LCD module by its sides. Never hold LCD module by applying force on the heat seal or TAB.
- When soldering, control the temperature and duration avoid damaging the backlight guide or diffuser which might degrade the display result such as uneven display.
- Never let LCD module contact with corrosive liquids, which might cause damage to the backlight guide or the electric circuit of LCD module.
- Only clean LCD with a soft dry cloth, Isopropyl Alcohol or Ethyl Alcohol. Other solvents (e.g. water) may damage the LCD.
- Never add force to components of LCD module. It may cause invisible damage or degrade the module’s reliability.
- When mounting LCD module, please make sure it is free from twisting, warping and bending.
- Do not add excessive force on surface of LCD, which may cause the display color change abnormally.
- LCD panel is made with glass. Any mechanical shock (e.g. dropping from high place) will damage the LCD module.
- Protective film is attached on LCD screen. Be careful when peeling off this protective film, since static electricity may be generated.
- Polarizer on LCD gets scratched easily. If possible, do not remove LCD protective film until the last step of installation.

- When peeling off protective film from LCD, static charge may cause abnormal display pattern. The symptom is normal, and it will turn back to normal in a short while.
- LCD panel has sharp edges, please handle with care.
- Never attempt to disassemble or rework LCD module.
- If display panel is damaged and liquid crystal substance 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.

CTP Mounting Instructions

Bezel Mounting (Figure 1)

- The bezel window should be bigger than the CTP active area. It should be≥0.5mm each side.
- Gasket should be installed between the bezel and the CTP surface. The final gap should be about 0.5~1.0mm.
- It is recommended to provide an additional support bracket for backside support when necessary (e.g. slim type TFT module without mounding structure). They should only provide appropriate support and keep the module in place.
- The mounting structure should be strong enough to prevent external uneven force or twist act onto the onto the module.

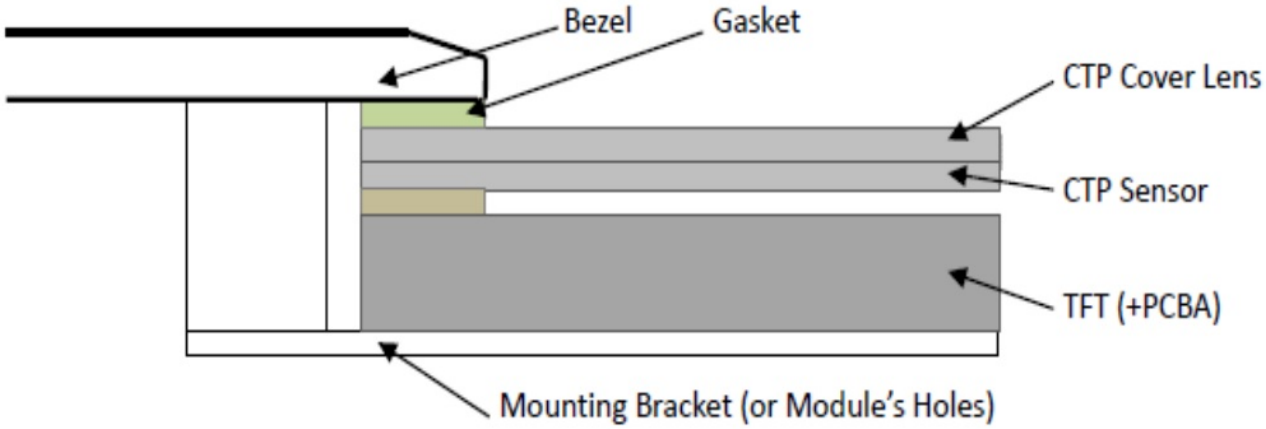


Figure 1

Surface Mounting (Figure 2)

- As the CTP assembling on the countersink area with double side adhesive.
  The countersink area should be flat and clean to ensure the double side adhesive installation result.
- The Bezel is recommend to keep a gap (≥0.3mm each side) around the cover lens for tolerance.
- It is recommended to provide an additional support bracket with gasket for backside support when necessary (e.g. TFT module without mounding structure). They should only provide appropriate support and keep the module in place.
- The mounting structure should be strong enough to prevent external uneven force or twist act onto the module.

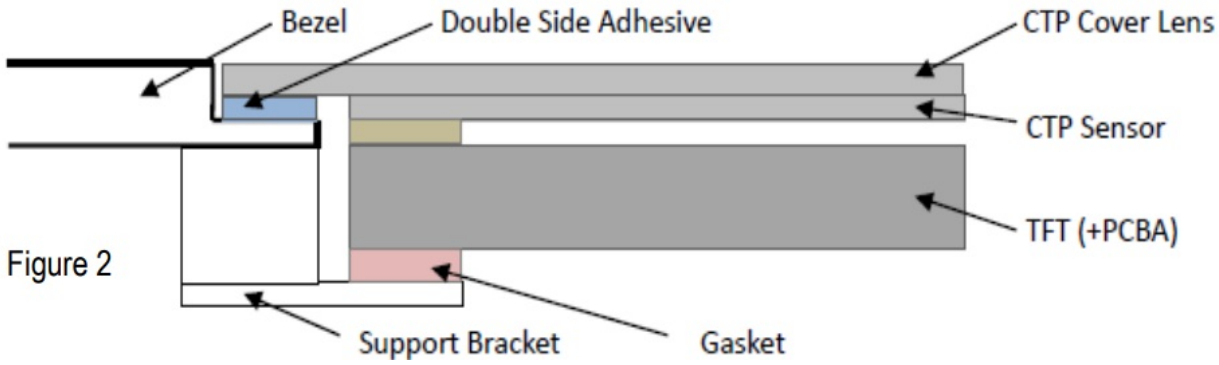


Figure 2

Additional Cover Lens Mounting (Figure 3)

- For the case of additional cover Lens mounting, it is necessary to recheck with the CTP specification about the material and thickness to ensure the functionality.
- It should keep a 0.2~0.3mm gap between the cover lens and the CTP surface..
- The cover lens window should be bigger than the active area of the CTP.It should be≥0.5mm each side.
- It is recommended to provide an additional support bracket for backside support when necessary (e.g. slim type TFT module without mounding structure). They should only provide appropriate support and keep the module in place.
- The mounting structure should be strong enough to prevent external uneven force or twist act onto the module.

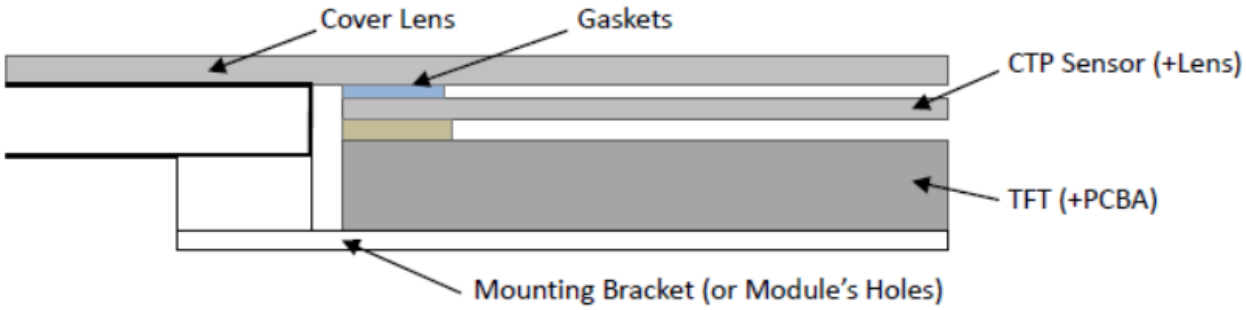


Figure 3

RTP Mounting Instructions

- It should bezel touching the RTP Active Area (A.A.) to prevent abnormal touch.It should left gab D=0.2~0.3mm in between.
  (Figure 4)
- Outer bezel design should take care about the area outside the A.A. Those areas contain circuit wires which is having different thickness. Touching those areas could de-form the ITO film. As a result bezel the ITO film be damaged and shorten its lifetime. It is suggested to protect those areas with gasket (between the bezel and RTP).The suggested figures are B≥0.50mm; C≥0.50mm.
  (Figure 4)
- The bezel side wall should keep space E= 0.2 ~ 0.3mm from the RTP. (Figure 4)

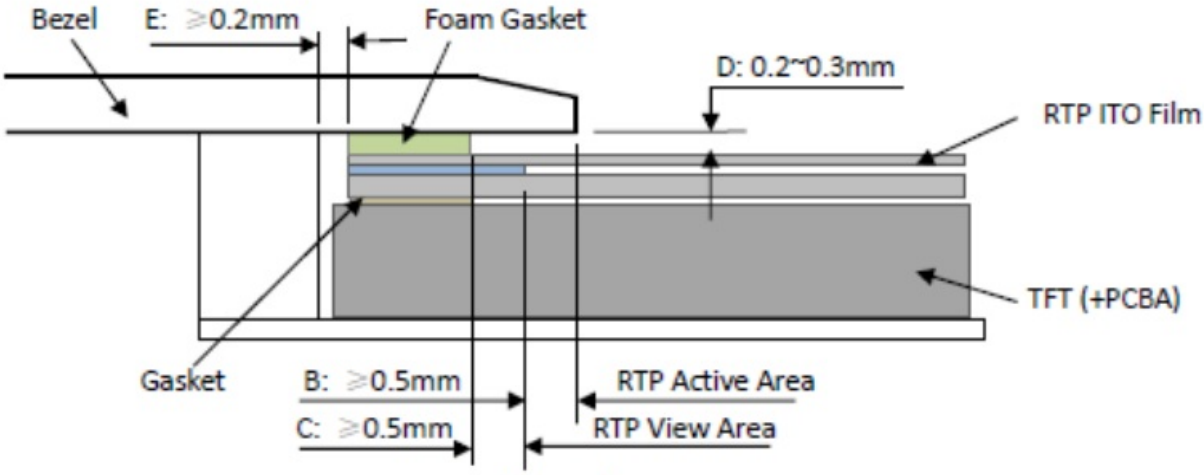


Figure 4

- In general design,
  RTP V.A. should be bigger than the TFT V.A.
  and RTP A.A. should be bigger than the TFT A.A.
  (Figure 5)

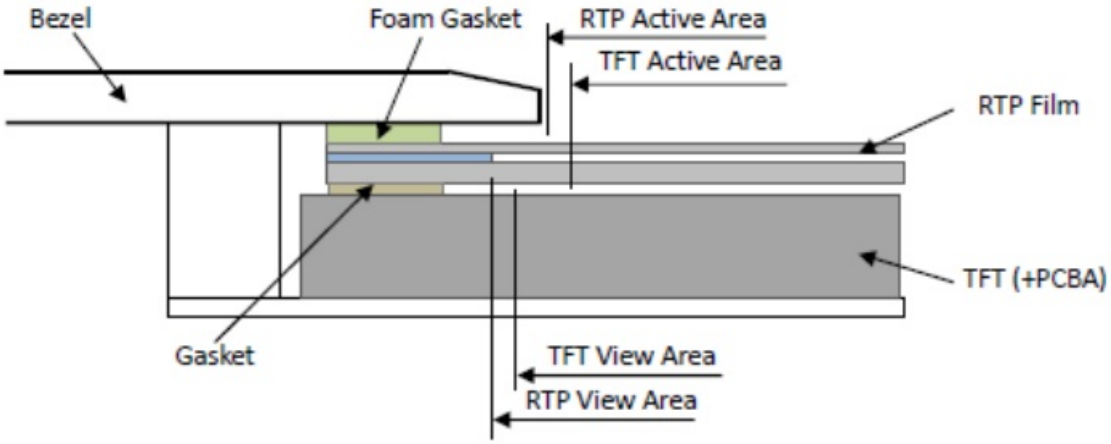


Figure 5

Warranty

This product has been manufactured to our company's specifications as a part for use in your company's general electronic products. It is guaranteed to perform according to delivery specifications. For any other use apart from general electronic equipment, we cannot take responsibility if the product is used in medical devices, nuclear power control equipment, aerospace equipment, fire and security systems, or any other applications in which there is a direct risk to human life and where extremely high levels of reliability are required. If the product is to be used in any of the above applications, we will need to enter into a separate product liability agreement.

- We cannot accept responsibility for any defect, which may arise form additional manufacturing of the product (including disassembly and reassembly), after product delivery.
- We cannot accept responsibility for any defect, which may arise after the application of strong external force to the product.
- We cannot accept responsibility for any defect, which may arise due to the application of static electricity after the product has passed our company's acceptance inspection procedures.
- When the product is in CCFL models, CCFL service life and brightness will vary according to the performance of the inverter used, leaks, etc. We cannot accept responsibility for product performance, reliability, or defect,

which may arise.

- We cannot accept responsibility for intellectual property of a third part, which may arise through the application of our product to our assembly with exception to those issues relating directly to the structure or method of manufacturing of our product

URL: www.topwaydisplay.com
Document Name: HMT068BTA-C-Manual-Rev0.4.doc

TOPWAY

Documents / Resources

	Topway Display HMT068BTA-C LCD Module [pdf] User Manual HMT068BTA-C LCD Module, HMT068BTA-C, LCD Module, Module

References

- -7 -2.8 - |
- -7 -2.8 - |

Manuals+,