深圳市拓普微科技开发有限公司
SHENZHEN TOPWAY TECHNOLOGY CO., LTD.

HMT056ATA-C

LCD Module User Manual

Prepared by:	Checked by:	Approved by:
Liu sanyong		
Date: 2018-03-31	Date:	Date:

Rev.	Descriptions	Release Date
0.1	- Preliminary Draft release	2018-03-19
0.2	Update section 3.1	2018-03-31

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1 Basic Specification

TOPWAY HMT056ATA-C is a Smart TFT Module with 32bit MCU on board. Its graphics engine provides numbers of outstanding features. It supports TOPWAY TML 2.4 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.

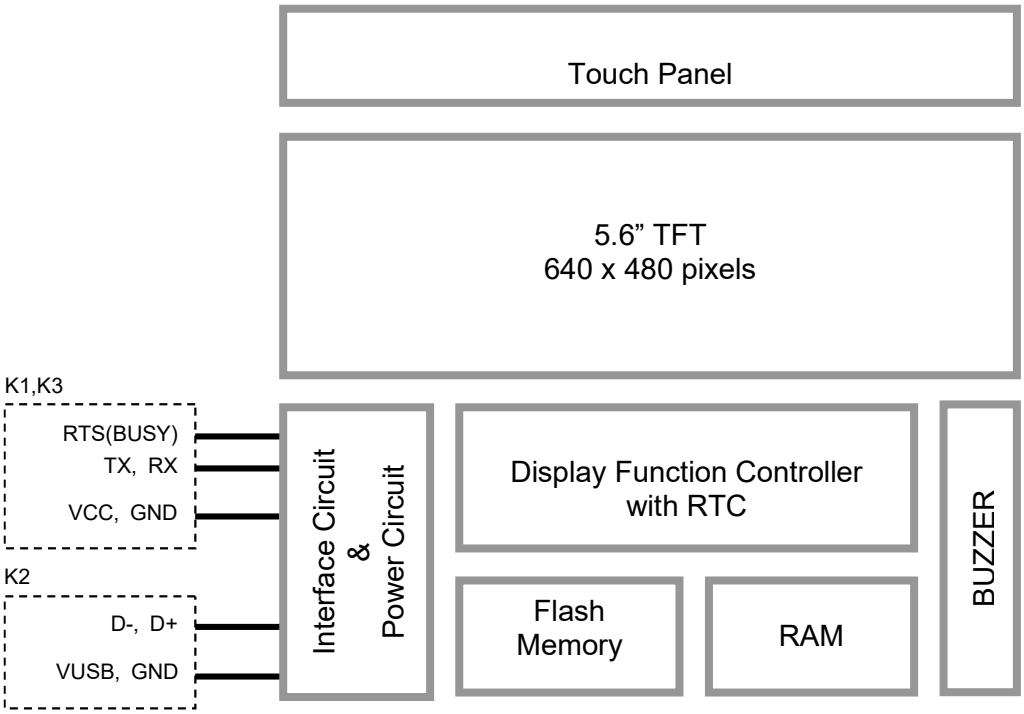
1.1 General Specification

Screen Size(Diagonal) :	5.6”
Resolution :	640(RGB) x480
Color Depth :	65k color (16bit)
Pixel Configuration :	RGB Stripe
Display Mode :	Transmissive / Normal White
Viewing Direction :	6H (*1) (gray-scale inverse) 12H (*2)
Outline Dimension :	144.8 x 110.2 x 21.6 (max)(mm) (see attached drawing for details)
Active Area :	112.9 x 84.67 (mm)
Backlight :	LED
Command I/F:	RS-232C
Project Download:	by PC
Operating Temperature :	-20 ~ +70°C
Storage Temperature :	-30 ~ +80°C

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.

1.2 Block Diagram



1.3 Terminal Function

RS232 Interface Terminal (K1)

Pin No.	Pin Name	I/O	Descriptions
1,2,3	VCC	P	Power supply (6~26 V)
4	NC	--	--
5	RX	I	Data Input (eg. to PC's RS-232C pin3 <9pin D-connector>)
6	TX	O	Data output (eg. to PC's RS-232C pin2 <9pin D-connector>)
7	RTS(BUSY)	O	Request To Send (could function as busy BUSY signal) (eg. to PC's RS-232C pin8 <9pin D-connector>)
8,9,10	GND	P	Ground, (0V)

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

RS232 Interface Terminal (K3)

Pin No.	Pin Name	I/O	Descriptions
1,2	VCC	P	Power supply (6~26 V)
3	RTS(BUSY)	--	Request To Send (could function as busy BUSY signal) (eg. to PC's RS-232C pin8 <9pin D-connector>)
4	TX	O	Data output (eg. to PC's RS-232C pin2 <9pin D-connector>)
5,6	RX	I	Data Input (eg. to PC's RS-232C pin3 <9pin D-connector>)
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(5.0 V)
2	D-	I/O	USB DATA negative signal
3	D+	I/O	USB DATA positive signal
4	NC	--	No connection,leave open
5	GND	P	Ground, (0V)

Note.
*1. TML files and image files preload through this terminal
*2. Standard "USB-drive" functions provided
*3. During the files transfer, all others display functions will be suspended

2 Absolute Maximum Ratings

Items	Symbol	Min.	Max.	Unit	Condition
Power Supply voltage	V_{CC}	-0.3	26.0	V	
Operating Temperature	T_{OP}	-20	70	℃	No Condensation
Storage Temperature	T_{ST}	-30	80	℃	No Condensation

Note:
*1. This rating applies to all parts of the module and should not be exceeded.
*2. The operating temperature only guarantees operation of the circuit. The contrast, response speed, and the other specification related to electro-optical display quality is determined at the room temperature, T_{OP}=25℃
*3. Ambient temperature when the backlight is lit (reference value)
*4. Any Stresses exceeding the Absolute Maximum Ratings may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

3 Electrical Characteristics

3.1 DC Characteristics

GND=0V, VCC=12.0V,T_{OP} =25℃

Items	Symbol	MIN.	TYP.	MAX.	Unit	Applicable Pin/FUNC
Operating Voltage	V_{CC}	6.0	12.0	26.0	V	VCC
RxD Input MARK(1)	V_{RxDM}	-3.0	-	-15.0	V	RxD
RxD Input SPACE(0)	V_{RxDS}	+3.0	-	+15.0	V	RxD
TxD Output MARK(1)	V_{TxDM}	-3.0	-	-15.0	V	TxD
TxD Output SPACE(0)	V_{TxDS}	+3.0	-	+15.0	V	TxD
RTS(BUSY) Output High	V_{TxH}	-3.0	-	-15.0	V	RTS(BUSY)
RTS(BUSY) Output Low	V_{TxL}	+3.0	-	+15.0	V	RTS(BUSY)
Operating Current	I_{CC}	-	240	500	mA	VCC (*1)
Operating Current (USB)	I_{VUSB}	-	200	-	mA	VUSB
Battery Supply Current	I_{BAT}	-	6	-	uA	(*2)

Note.
*1. Normal display condition

3.2 AC Characteristics

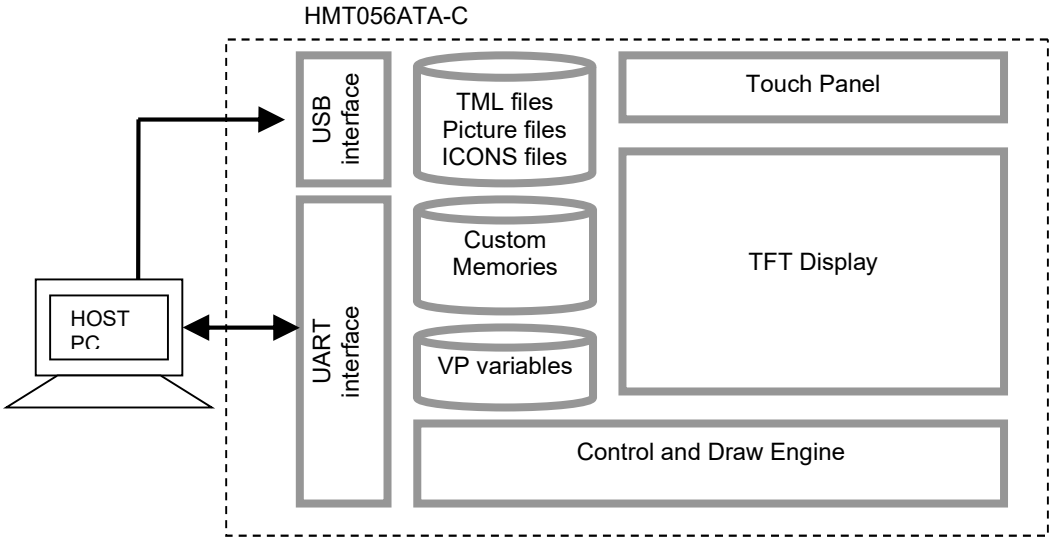
Items	JP1,JP7=close, JP2,JP8=open (factory default)	JP1,JP8=close, JP2,JP7=open	JP1,JP8= open, JP2,JP7= close	JP1,JP7= open, JP2,JP8= close
Start bit	1	1	1	1
Data bit	8	8	8	8
Parity bit	None	None	Even	Odd
Stop bit	1	1	1	1
Baud Rate(*1)	115200 bps	9600 bps	115200 bps	115200 bps

Items	JP3=close, JP4=open (factory default)	JP3= open, JP4=close
Serial Data Flow Control	busy	Xon/Xoff

Note.
*1.Baud Rate (1200bps～115200bps) could be adjusted by software.

4 Function Specifications

4.1 Basic Operation Function Descriptions



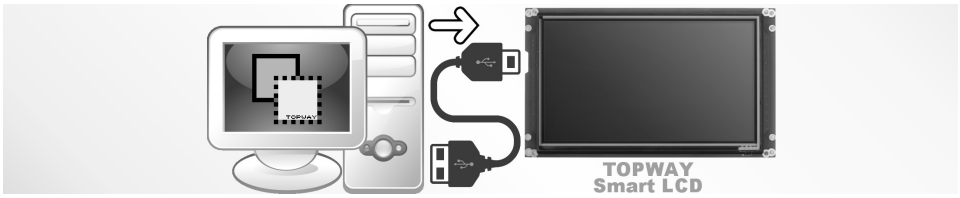
- TML files, Picture files, ICON files are stored inside FLASH memory area.
  They are preloaded to HMT056ATA-C for stand alone interface use.
- Those files are preloaded via USB interface as an USB drive.
- All the interface flow and the touch response are based on the preloaded TML files
- VP variables 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

4.2 Quick Start Guide

1. Install TOPWAY Graphics Editor

2. Import pictures design UI flow

3. Download to Smart LCD



4. power on & display

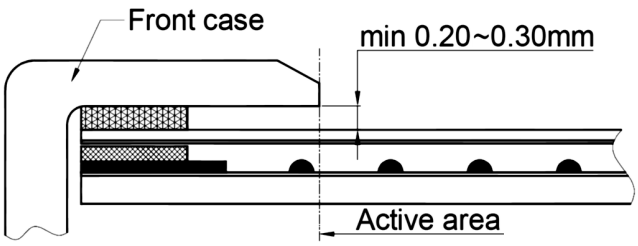
5. Connect to host Show real time data

4.3 Command Descriptions

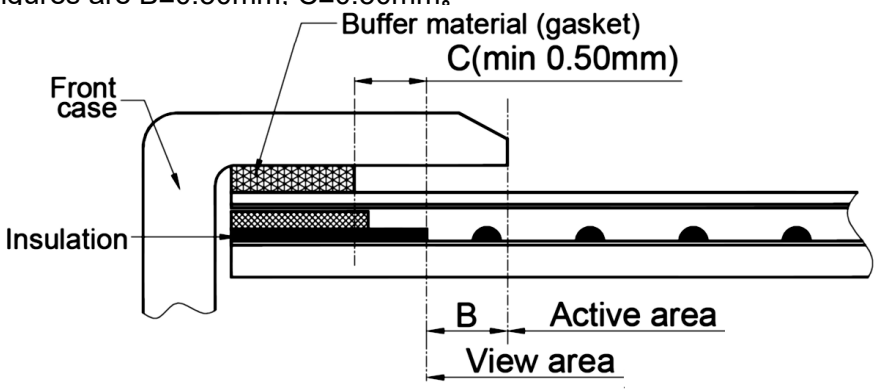
Please refer to “SMART LCD Command Manual”.

5 Touch panel Design Precautions

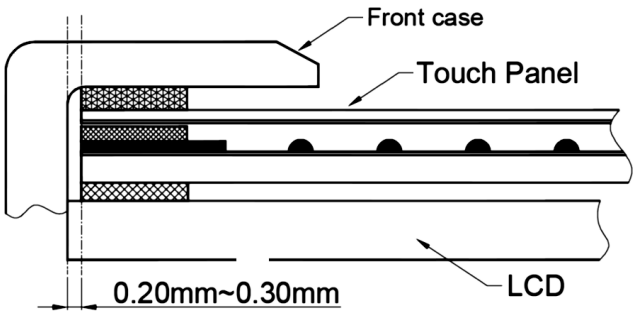
1. It should prevent front case touching the touch panel Active Area (A.A.) to prevent abnormal touch.
   It should left gab (e.g. 0.2~0.3mm) in between.



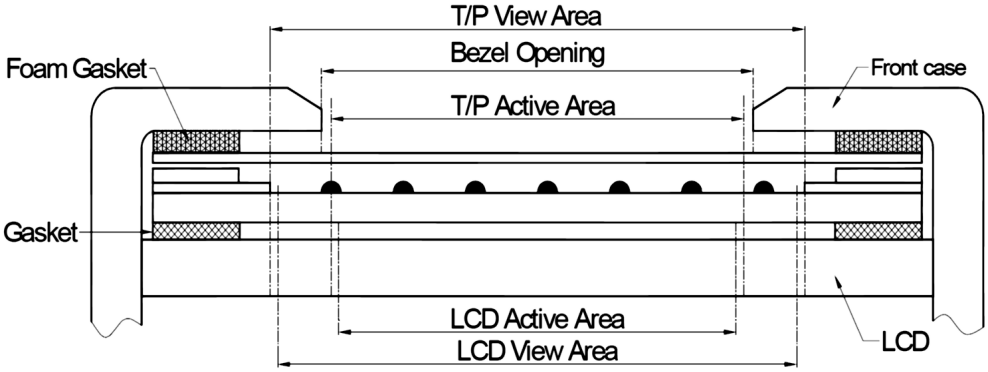
2. Outer case design should take care about the area outside the A.A.
   Those areas contain circuit wires which is having different thickness. Touching those areas could deform the ITO film. As a result case the ITO cold be damaged and shorten its lifetime.
   It is suggested to protect those areas with gasket (between the front case and the touch panel).
   The suggested figures are B≥0.50mm; C≥0.50mm。



3. The front case side wall should keep space (e.g. 0.2 ~ 0.3mm) from the touch panel.

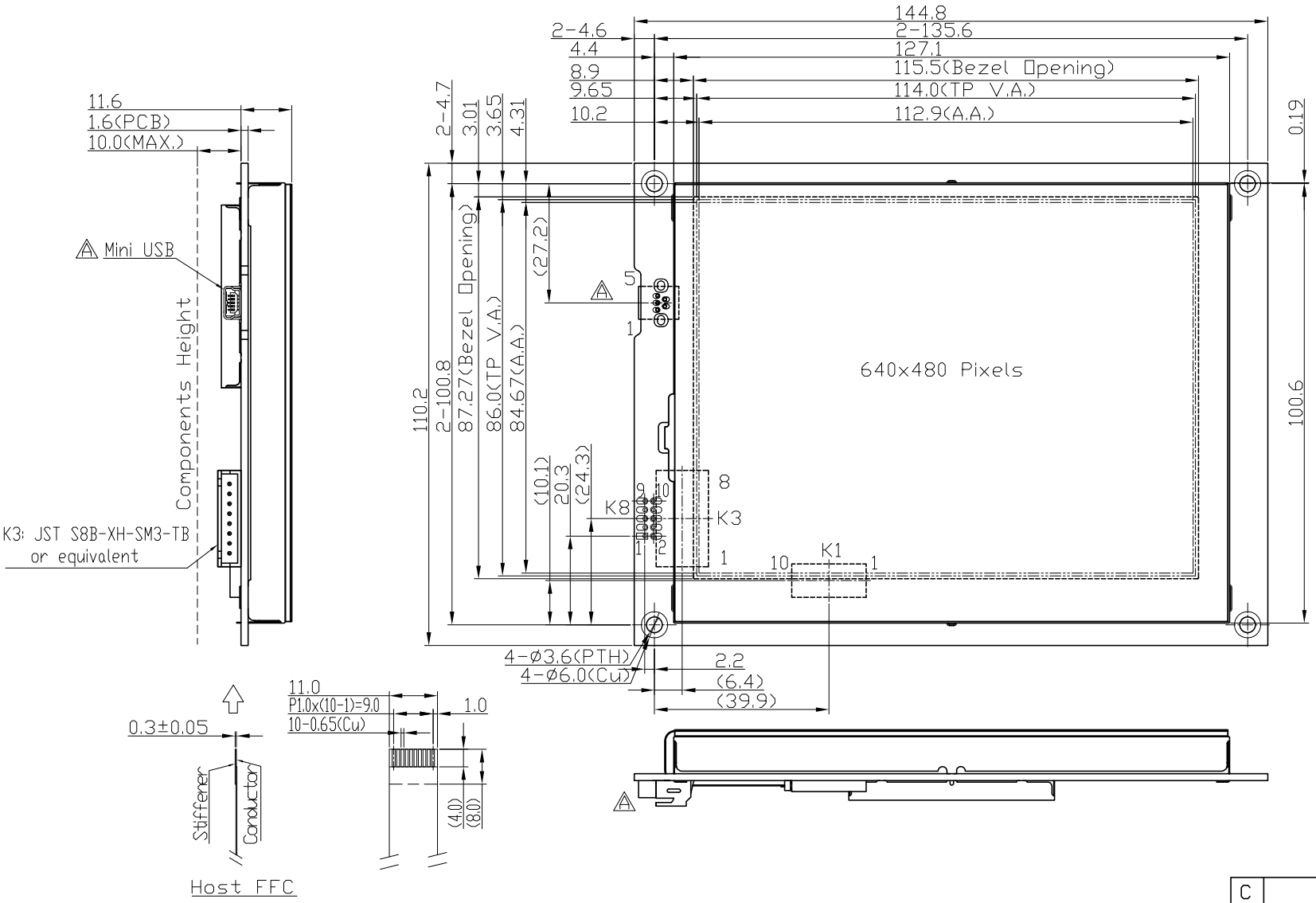


4. In general design,
   touch panel V.A. should be bigger than the LCD V.A.
   and touch panel A.A. should be bigger than the LCD A.A.



6 Precautions of using LCD Modules

Please refer to "LCD-Module-Design-Handling-Precaution.pdf".



K1&K8 Terminal	
No	Pin Name
1	VCC
2	VCC
3	VCC
4	NC
5	RX
6	TX
7	RTS(BUSY)
8	GND
9	GND
10	GND

K3 Terminal	
No	Pin Name
1	VCC
2	VCC
3	RTS(BUSY)
4	TX
5	RX
6	RX
7	GND
8	GND

Note:
*1. LCD Display Type: TFT,Transmissive
*2. Operating Voltage : 6~26V
*3. Backlight Color : White LEDs
*4. Pixel Arrangment : RGB-STRIPE
*5. Color Depth : 65k colors
*6. Interface : RS-232C
*7. Touch Panel Type : Resistive Touch Panel
*8. Foam Gasket must be assemble outside TP V.A. by 0.5mm
*9. Operating Temperature : -20°C~70°C
*10. Storage Temperature : -30°C~80°C

Rev	Note	Date
C		
B		
A	Revise Mini USB	2018-06-30 Wei Guangyang

Dwg Title	HMT056ATA-C Outline Dwg		
Dwg No.	MK-006268a-1-1		Date 2018-01-26
Scale 1/1	Tol. ±0.5	Unit mm	Paper Size A3
Approved	Checked	Drawn Wei Guangyang	

TOPWAY