Alaonix 256x160 Smart LCD display

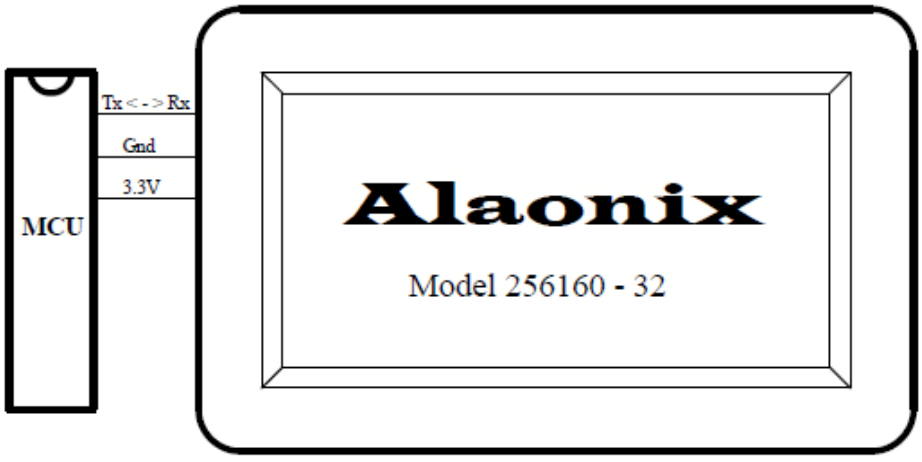
Alaonix 256x160 (3.2” And 5.0”) LCD display is a monochrome smart display. It is strongly recommended that you read the manual before using the 256x160 smart LCD display. Alaonix LCD display makes it even quicker and easier for you to make your projects or products with any microcontrollers (MCUs). The operate command language is much simpler, easier to read and write. It can do many things that you want. And it also saves your MCU’s space, your time and save your money.

SPECS

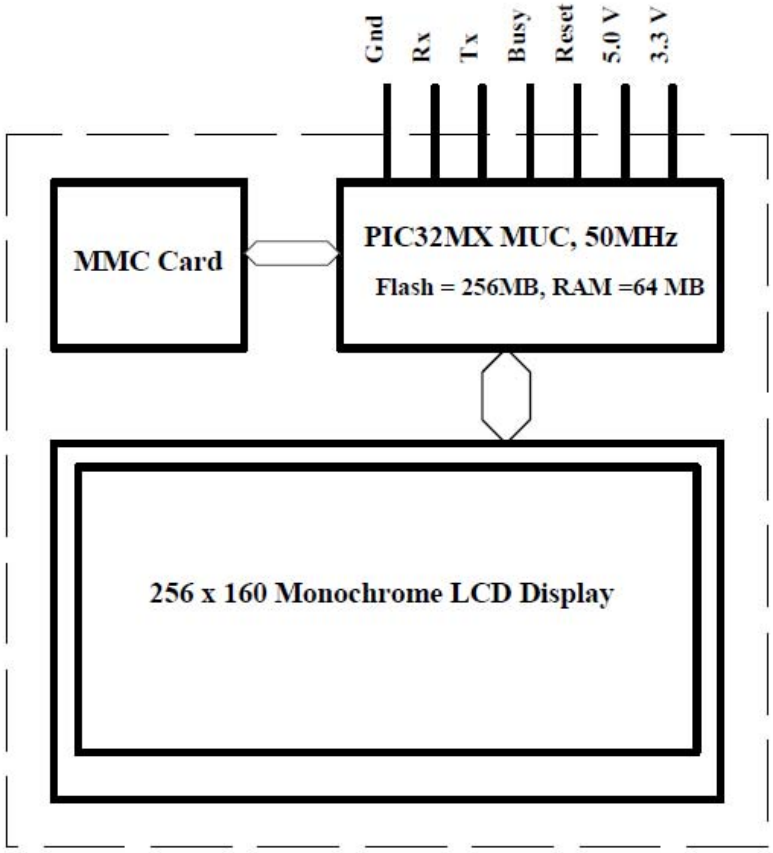
Power: 5V or 3.3V VDC < 100mA (with LCD backlight)
PCB: Size: 94mm x 70mm
Speed: 19200 Baud.
Media: Uses FAT16 MMC or SD memory cards from 32 MB to 2GB.

PIN FUNCTIONS

3.3V Supply voltage to LCD Display
5V Supply voltage to LCD Display
Reset: This pin can be set at the low level to restart module, if the module stops working for any reason.
Busy: This pin shows the module work state. If the LCD display is busy, the pin output level will be high (LED light will be on)
Tx: Serial output connection. The LCD display allows 19200 baud.
Rx: Serial input connection. The LCD display allow 19200 baud.
GND: Power supply and serial ground. This MUST also be connected to ground on the device to allow the serial data to be sent to the modul



MINIMUM CONNECTION



Alaonix Smart LCD Dispaly Block Diagram

What is new?

1) MMC function: This function can help user to save images, data, command code and customer's font files.
2) The LCD module can automatically display monochrome bitmap images (width <= 256, height <= 160).
3) It also includes more Geometry functions. It can help customers to draw lines, dash lines, Horizontal lines, vertical lines, Rectangle, Square, Ellipse, Triangle…… It has an analog needle meter function for customers.
4) It has more different size fonts, numbers and segment's numbers. If customer want to use his own style font, it is very easy to achieve.

It is a very powerful product. Please see sample videos and sample codes for help.

LIABILITY WARNING:
This device should be used only for experimental purposes. It has **NOT** gone through extensive testing and it could erase or corrupt some or all data on media cards that are inside the device. You assume to take your own risk when you purchase this device, and release the responsibility and liability from the manufacturer with no harm.

REGULATORY WARNING:
This device is intended solely for experimental purpose, it is not in finished product form and is **NOT** FCC approved. If you wish to install these modules into non-experimental final finished products, you will be responsible to have the modules approved by the FCC at your own cost.

Alaonix 256x160 smart LCD display commands

Note: When the command is sent, the display needs a pause to process the command, the busy pin will be HIGH. And it will be LOW after finishing the process.

Extension Command A:

C: Fill selected buffer

Prototype	AC, Color,Buffer#
Description	C; Fill selected LCD buffer and load the data to screen. c; Fill selected LCD buffer and not load the data to screen.:
Parameters	• Color: color parameter. Valid values: 0 - 1 • Buffer#: buffer parameter. Valid values: 0 - 5 • The parameter color determines: 0 white, 1 black, and 2 inverts each dot.
Example	copy buffer number = 0 to LCD display with white color: AC,0,0 or Ac,0,0
Notes	Every command must have an end symbol (0x0D + 0x0A)

D: Copy selected buffer to screen

Prototype	AD,Buffer#
Description	Copy selected buffer data to screen.
Parameters	• Buffer#: buffer parameter. Valid values: 0 - 5
Example	copy buffer number = 2 to LCD display: AD,2
Notes	Every command must have an end symbol (0x0D + 0x0A)

T: Copy data from buffer A to Buffer B

Prototype	AT,Buffer_A,Buffer_B
Description	Only copy data from one buffer to another buffer.
Parameters	• Buffer_A: data is on this Buffer, Valid values: 0 – 5 • Buffer_B: data will be on this Buffer, Valid values: 0 – 5
Example	copy data from buffer number = 2 to buffer number = 4 AT,2,4
Notes	Every command must have an end symbol (0x0D + 0x0A)

R: Reverse buffer data

Prototype	AR.Buffer#
Description	Reverse buffer data
Parameters	• Buffer#: Buffer parameter. Valid values: 0 – 5
Example	Reverse buffer number = 3 data. AR,3
Notes	Every command must have an end symbol (0x0D + 0x0A)

O: Turn LCD display ON or OFF

Prototype	AO,n
Description	Turn LCD display ON or OFF
Parameters	• n = command parameter. Valid values: 0 – 1. 0 = OFF, 1 = ON (default n = 1)
Example	Turn LCD display OFF AO,0
Notes	Every command must have an end symbol (0x0D + 0x0A)

I: Set LCD display to White/Black or Black/White

Prototype	AI,n
Description	Set LCD display to Normal display or Inverse Display.
Parameters	• n = command parameter. Valid values: 0 – 1. 0 = = Normal display, 1 = Inverse Display • (default n = 0)
Example	Set LCD display as Normal display AI,0
Notes	Every command must have an end symbol (0x0D + 0x0A). Some model LCDs do not support Inverse display.

B: Adjust LCD display backinght

Prototype	AB,n
Description	Adjust LCD display backlight
Parameters	• n = command parameter. Valid values: 0 – 10. (Default n = 10) • (default n = 0)
Example	Adjust LCD display backlight values = 8 AB,8
Notes	Every command must have an end symbol (0x0D + 0x0A)

V: Adjust LCD display contrast

Prototype	AV, contrast_data
Description	Adjust LCD display contrast.
Parameters	contrast_data; contrast data parameter. Valid values: 0 – 255. (Default n = 157)
Example	AV,
Notes	Every command must have an end symbol (0x0D + 0x0A)

S: Save as default seeting

Prototype	AS,
Description	Save default setting data to EEprom. (LCD = Black/While, Backlight = 10, Trans
Parameters	None
Example	AS,
Notes	Every command must have an end symbol (0x0D + 0x0A)

Extension Command F: (Write text)

A: Write text to screen

Prototype	FA,font#,x_position,y_postion,space,color,buffer#,text
Description	A: Write text to LCD buffer and copy the buffer data to screen. a: Write text to LCD buffer and not copy the buffer to screen.
Parameters	• Font#: font type or buffer number. • x_position: text starting position on x-axis. • y_position: text starting position on y-axis. • space: distance between characters • color: color parameter. Valid values: 0 - 1 • buffer#: buffer parameter. Valid values: 0 - 5 • text: text to be written.
Example	Write Times New Roman 29x26 font “Hello, world!” to LCD screen FA,21,10,20,2,1,0,Hello,word!
Notes	Every command must have an end symbol (0x0D + 0x0A)

B: Write character on the screen

Prototype	FB,font#,x_position,y_postion,color,character
Description	B: Write character to LCD buffer and copy the buffer data to screen. b: Write character to LCD buffer and not copy the buffer data to screen.
Parameters	• Font#: font type or buffer number. • x_position: text starting position on x-axis. • y_position: text starting position on y-axis. • color: color parameter. Valid values: 0 - 1 • buffer#: buffer parameter. Valid values: 0 - 5 • text: character to be written.
Example	Write Times New Roman 29x26 font “A” to LCD screen FB,21,10,20,1,0,A
Notes	Every command must have an end symbol (0x0D + 0x0A)

C: Write text to screen without back color

Prototype	FC,font#,x_position,y_postion,space,color,buffer#,text
Description	C: Write text to LCD display without back color and copy buffer data to screen. c: Write text to LCD display without back color and not copy buffer data to screen.
Parameters	• Font#: font type or buffer number. • x_position: text starting position on x-axis. • y_position: text starting position on y-axis. • space: distance between characters • color: color parameter. Valid values: 0 - 1 • buffer#: buffer parameter. Valid values: 0 - 5 • text: text to be written.
Example	Write Times New Roman 29x26 font “Hello, world!” to LCD screen FC,21,10,20,2,1,0,Hello,word!
Notes	Every command must have an end symbol (0x0D + 0x0A)

D: Write character on the screen

Prototype	FD,font#,x_position,y_postion,color,character
Description	D: Write character to LCD display without back color and copy the buufer data to screen. d: Write character to LCD display without back color and not copy the buufer data to screen.
Parameters	• Font#: font type or buffer number. • x_position: text starting position on x-axis. • y_position: text starting position on y-axis. • color: color parameter. Valid values: 0 - 1 • buffer#: buffer parameter. Valid values: 0 - 5 • text: character to be written.
Example	Write Times New Roman 29x26 font “A” to LCD screen FD,21,10,20,1,0,A
Notes	Every command must have an end symbol (0x0D + 0x0A)

L: Load customer font to a selected buffer from SD Card

Prototype	FL,buffer#,font_name
Description	Load a customer font to a select buffer from SD Card.
Parameters	• buffer#: buffer parameter. Valid values: 0 - 5 • font_name: customer make the font name.
Example	Load a customer font “my_font” to buffer number = 5 FL,5,my_font
Notes	Every command must have an end symbol (0x0D + 0x0A)

Font number, type, size and buffer size: (in system)

The display use Fonts with the Microchip Graphics Library (AN1182). Please visit Microchip web for detail.

	Code for char num
10 = Arial_Narrow_8x11	32 - 127
11 = Arial_Narrow_12x15	32 - 127
12 = Arial_Narrow_18x20	32 - 127
13 = Arial_Narrow_22x25	32 - 127
14 = Arial_Narrow_26x30	32 - 127
15 = Arial_Narrow_30x37	32 - 127
16 = Arial_Narrow_38x47	32 - 127
17 = Arial_Narrow_50x64	32 - 127
20 = Times_New_Roman_15x16	32 - 127
21 = Times_New_Roman_20x20	32 - 127
22 = Times_New_Roman_29x26	32 - 127
23 = Times_New_Roman_37x35	32 - 127
24 = Times_New_Roman_46x47	32 - 127
25 = Times_New_Roman_63x62	32 - 127
30 = Number_Arial_6x10	39 - 58
31 = Number_Arial_8x14	39 - 58
32 = Number_Arial_11x19	39 - 58
33 = Number_Arial_16x25	39 - 58
34 = Number_Arial_23x35	39 - 58
35 = Number_Arial_38x56	39 - 58
36 = Number_Arial_48x70	39 - 58
37 = Seg_15x23	48 - 47
38 = Seg_21x35	44 - 58
39 = u_Ohm_15x27	40 - 45

Customer can use other fonts these made by customers. (See sample codes for detail)

0 = buffer0, size = 26kb
1 = buffer1, size = 5kb
2 = buffer2, size = 5kb
3 = buffer3, size = 5kb
4 = buffer4, size = 5kb
5 = buffer5, size = 5kb

Extension Command G: (Geometry)

A: Draw a line to LCD display

Prototype	GA, x_start, y_start, x_end, y_end,color,buffer#
Description	A: Draws a line to buffer and copy the buffer to screen. a: Draws a line to buffer and not copy the buffer to screen.
Parameters	• x_start: x coordinate of the line start. Valid values: 0 - 255 • y_start: y coordinate of the line start. Valid values: 0 - 255 • y_end: y coordinate of the line end. Valid values: 0 - 159 • color: color parameter. Valid values: 0 - 1 • buffer#: buffer parameter. Valid values: 0 - 5
Example	Draw a line between dots (0,0) and (255,159), color = 1 buffer# = 0 on LCD display GA,0,0,255,159,1,0
Notes	Every command must have an end symbol (0x0D + 0x0A)

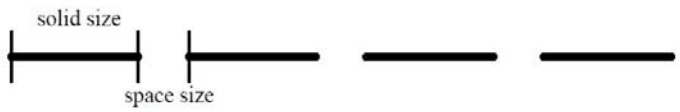
B: Draw a horizontal line on LCD display

Prototype	GB, x_start, x_end, y_position, size, color, buffer#
Description	A: Draws a Horizontal line to buffer and copy the buffer to screen. a: Draws a Horizontal line to buffer and not copy the buffer to screen.
Parameters	• x_start: x coordinate of the line start. Valid values: 0 - 255 • x_end: x coordinate of the line end. Valid values: 0 - 255 • y_position: y coordinate of horizontal line position. Valid values: 0 - 159 • size: line size • color: color parameter. Valid values: 0 - 1 • buffer#: buffer parameter. Valid values: 0 - 5
Example	Draw a Horizontal line size = 2 dots, between dots (10,50) and (200,50) color = 1, buffer# = 0 on LCD display GB,10,200,50,2,1,0
Notes	Every command must have an end symbol (0x0D + 0x0A)

C: Draw a vertical line on LCD display

Prototype	GC, x_position, y_start, y_end, size, color, buffer#
Description	C: Draws a vertical line to buffer and copy the buffer to screen. c: Draws a vertical line to buffer and not copy the buffer to screen.
Parameters	• x_position: x coordinate vertical line position. Valid values: 0 - 255 • y_start: y coordinate of the line start. Valid values: 0 - 159 • y_end: x coordinate of the line end. Valid values: 0 - 159 • size: line size • color: color parameter. Valid values: 0 - 1 • buffer#: buffer parameter. Valid values: 0 - 5
Example	Draw a vertical line size = 3 dots, between dots (100,10) and (100,150), color = 1, buffer# = 0 on LCD display GC,100,10,150,3,1,0
Notes	Every command must have an end symbol (0x0D + 0x0A)

D: Draw a horizontal dash line on LCD display

Prototype	GD, x_start, x_end, y_position, size, dash_ length, dash_space, color, buffer#
Description	D: Draws a Horizontal dash line to buffer and copy the buffer to screen. d: Draws a Horizontal dash line to buffer and not copy the buffer to screen.
Parameters	• x_start: x coordinate of the dash line start. Valid values: 0 - 255 • x_end: y coordinate of the dash line start. Valid values: 0 - 255 • y_position: y coordinate of the dash line position. Valid values: 0 - 159 • size: line size • dash_ length = dash line solid size + space size • dash_space = dash line space size • color: color parameter. Valid values: 0 - 1 • buffer#: buffer parameter. Valid values: 0 – 5 
Example	Draw a Horizontal dash line size = 2 dots, between dots (10,50) and (200,50), dash_ length = 10, dash_space = 4 color = 1, buffer# = 0 on LCD display GD,10,220,60,2,10,4,1,0
Notes	Every command must have an end symbol (0x0D + 0x0A)

V: Draw a vertical dash line on LCD display

Prototype	GE, x_position, y_start, y_end, size, dash_ length, dash_space, color, buffer#
Description	V: Draws a vertical dash line to buffer and copy the buffer to screen. v: Draws a vertical dash line to buffer and not copy the buffer to screen.
Parameters	• x_position: x coordinate of the dash line position. Valid values: 0 - 255 • y_start: y coordinate of the dash line start. Valid values: 0 - 159 • y_end: y coordinate of the dash line end. Valid values: 0 - 159 • size: line size • dash_ length = dash line solid size + space size • dash_space = dash line space size • color: color parameter. Valid values: 0 - 1 • buffer#: buffer parameter. Valid values: 0 - 5
Example	Draw a vertical dash line size = 3 dots, between dots (70,10) and (70,150), dash_ length = 10, dash_space = 3, color = 1, buffer# = 0 on LCD display GV,70,10,150,3,10,3,1,0
Notes	Every command must have an end symbol (0x0D + 0x0A)

F: Draw a Rectangle on LCD display

Prototype	GF, x_start, y_start, x_end, y_end, fill, color, buffer#
Description	F: Draws a rectangle to buffer and copy the buffer to screen. f: Draws a rectangle to buffer and not copy the buffer to screen.
Parameters	• x_start: x coordinate of the rectangle start. Valid values: 0 - 255 • y_start: y coordinate of the rectangle start. Valid values: 0 - 159 • x_end: x coordinate of the rectangle end. Valid values: 0 - 255 • y_end: y coordinate of the rectangle start. Valid values: 0 - 159 • fill: fill parameter. Valid values: 0 - 1 (0 = not fill, 1 = fill) • color: color parameter. Valid values: 0 - 1 • buffer#: buffer parameter. Valid values: 0 - 5
Example	Draw a rectangle width size = 150 – 30, high size = 120 – 30, fill = 1, color = 1, buffer# = 0 box on LCD display GF,30,30,150,120,1,1,0
Notes	Every command must have an end symbol (0x0D + 0x0A)

G: Draw a square on LCD display

Prototype	GG, x_start, y_start, Side_length, fill, color, buffer#
Description	G: Draws a square to buffer and copy the buffer to screen. g: Draws a square to buffer and not copy the buffer to screen.
Parameters	• x_start: x coordinate of the square start. Valid values: 0 - 255 • y_start: y coordinate of the square start. Valid values: 0 - 159 • Side length: square side length • fill: fill parameter. Valid values: 0 - 1 (0 = not fill, 1 = fill) • color: color parameter. Valid values: 0 - 1 • buffer#: buffer parameter. Valid values: 0 - 5
Example	Draw a square start position (30, 30), size length = 100, fill = 1, color = 1, buffer# = 0 box on LCD display GG,30,30,100,1,1,0
Notes	Every command must have an end symbol (0x0D + 0x0A)

H: Draw an ellipse on LCD display

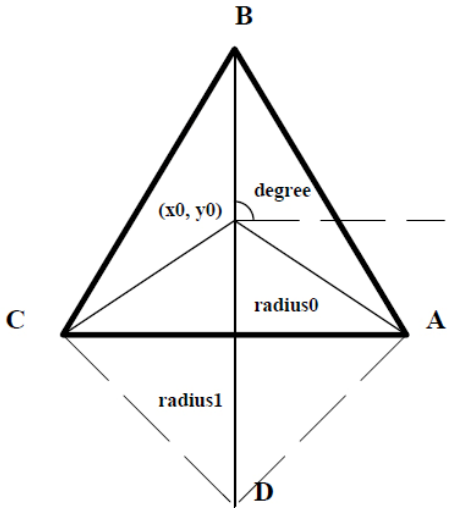
Prototype	GH,x_center, y_center, h_radius, v_radius, fill, color, buffer#
Description	H: Draws ellipse to buffer and copy the buffer to screen. h: Draws ellipse to buffer and not copy the buffer to screen.
Parameters	• x_centert: x coordinate of the ellipse center. Valid values: 0 - 255 • y_centert: y coordinate of the ellipse center. Valid values: 0 - 159 • h_radius: ellipse horizontal radius size • v_radius: ellipse vertical radius size • fill: fill parameter. Valid values: 0 - 1 (0 = not fill, 1 = fill) • color: color parameter. Valid values: 0 - 1 • buffer#: buffer parameter. Valid values: 0 - 5
Example	Draw an ellipse center point (128, 80), horizontal radius size = 70, vertical radius size = 40, fill = 1, color = 1, buffer# = 0 on LCD display GH,128,80,70,40,1,1,0
Notes	Every command must have an end symbol (0x0D + 0x0A)

I: Draw a circle on LCD display

Prototype	GI, x_center, y_center, radius, fill, color, buffer#
Description	I: Draws circles to buffer and copy the buffer to screen. i: Draws circles to buffer and not copy the buffer to screen.
Parameters	• x_centert: x coordinate of the circles center. Valid values: 0 - 255 • y_centert: y coordinate of the circles center. Valid values: 0 - 159 • radius: circles radius size • fill: fill parameter. Valid values: 0 – 1 (0 = not fill, 1 = fill) • color: color parameter. Valid values: 0 - 1 • buffer#: buffer parameter. Valid values: 0 - 5
Example	Draw a circles center point (128, 80), radius size = 550, fill = 1, color = 1, buffer# = 0 on LCD display. GI,128,80,55,1,1,0
Notes	Every command must have an end symbol (0x0D + 0x0A)

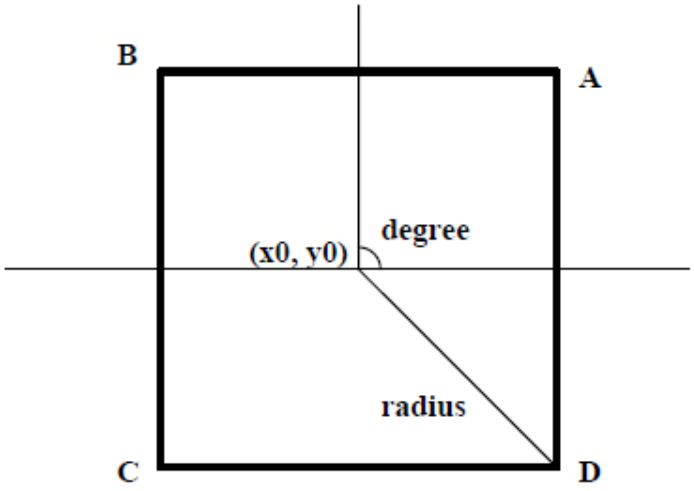
J: Draw a rotatable triangle on LCD display

Prototype	GJ, x_center, y_center, radius0, radius1, degree, type, fill, color, buffer#
Description	J: Draw a rotatable triangle to buffer and copy the buffer to screen. j: Draw a rotatable triangle to buffer and not copy the buffer to screen.
Parameters	• x_centert: x coordinate of the triangle center. Valid values: 0 - 255 • y_centert: y coordinate of the triangle center. Valid values: 0 - 159 • radius0: standard triangle radius size • radius1: customer triangle radius size • degree: a degree. • select: select a customer triangle style. Valid values: 0 – 3 0 = ABC, 1 = ABD, 2 = ACD, 3 = BCD (see fig. for detail.) • fill: fill parameter. Valid values: 0 – 1 (0 = not fill, 1 = fill) • color: color parameter. Valid values: 0 - 1 • buffer#: buffer parameter. Valid values: 0 - 5
Example	Draw a standard triangle center position (128, 80), radius size = 45, radius1 = not use, degree = 90, select = 0, fill = 1, color = 1, buffer# = 0 on LCD display. GJ,128,80,45,0,90,0,1,0,0
Notes	Every command must have an end symbol (0x0D + 0x0A)



K: Draw a rotatable square on LCD display

Prototype	GK, x_center, y_center, radius, degree, fill, color, buffer#
Description	K: Draw a rotatable square to buffer and copy the buffer to screen. k: Draw a rotatable square to buffer and not copy the buffer to screen.
Parameters	• x_centert: x coordinate of the triangle center. Valid values: 0 - 255 • y_centert: y coordinate of the triangle center. Valid values: 0 - 159 • raduis: Semi-diagonal • degree: a degree. • fill: fill parameter. Valid values: 0 – 1 (0 = not fill, 1 = fill) • color: color parameter. Valid values: 0 - 1 • buffer#: buffer parameter. Valid values: 0 - 5
Example	Draw a standard square center position (128, 80), radius size = 45, radius1 = not use, degree = 90, select = 0, fill = 1, color = 1, buffer# = 0 on LCD display. GK,128,80,45,0,0,1,0
Notes	Every command must have an end symbol (0x0D + 0x0A)



L: Draw a dot on LCD display

Prototype	GL, x_position, y_position, color, buffer#
Description	L: Draw a dot(pixel) to buffer and copy the buffer to screen. l: Draw a dot(pixel) square to buffer and not copy the buffer to screen.
Parameters	• x_position: x coordinate of the dot. Valid values: 0 - 255 • y_position: y coordinate of the dot. Valid values: 0 - 159 • color: color parameter. Valid values: 0 - 1 • buffer#: buffer parameter. Valid values: 0 - 5
Example	Draw a pixel (128, 80), color = 1, buffer# = 0 on LCD display. GL,128,80,1,0
Notes	Every command must have an end symbol (0x0D + 0x0A)

M: Draw a horizontal value bar on LCD display

Prototype	GM, x_position, y_position, y_end position, size, value, color, buffer#
Description	M: Draw a horizontal value bar to buffer and copy the buffer to screen. m: Draw a horizontal value bar square to buffer and not copy the buffer to screen.
Parameters	• x_position: x coordinate of the bar start. Valid values: 0 - 255 • y_position: y coordinate of the bar start. Valid values: 0 - 159 • y_end position: the value bar end position • value: value bar solid size • size: the bar size. • color: color parameter. Valid values: 0 - 1 • buffer#: buffer parameter. Valid values: 0 - 5
Example	Draw a horizontal value bar (10,10), y_end = 200, size = 20, color = 1, buffer# = 0 on LCD display. GM,10,10,200,20,80,1,0
Notes	Every command must have an end symbol (0x0D + 0x0A)

N: Draw a vertical value bar on LCD display

Prototype	GN, x_position, y_position, x_end position, size, value, color, buffer#
Description	N: Draw a vertical value bar to buffer and copy the buffer to screen. n: Draw a vertical value bar square to buffer and not copy the buffer to screen.
Parameters	• x_position: x coordinate of the bar start. Valid values: 0 - 255 • y_position: y coordinate of the bar start. Valid values: 0 - 159 • x_end position: the value bar end position • value: value bar solid size • size: the bar size. • color: color parameter. Valid values: 0 - 1 • buffer#: buffer parameter. Valid values: 0 - 5
Example	Draw a horizontal value bar (30,10), x_end = 150, size = 20, color = 1, buffer# = 0 on LCD display. GN,30,10,150,20,80,1,0
Notes	Every command must have an end symbol (0x0D + 0x0A)

Extension Command M: (Secure Digital (SD) or Multi Media Card (MMC))

P: Change current direction back to parents direction

Prototype	MP,
Description	This function changes the current directory back to parents direction
Parameters	None
Example	MP,
Notes	Every command must have an end symbol (0x0D + 0x0A)

R: Change current direction back to root direction

Prototype	MR,
Description	This function changes the current directory back to root direction
Parameters	None
Example	MR,
Notes	Every command must have an end symbol (0x0D + 0x0A)

I: show current direction information

Prototype	MI,
Description	Show current direction information (the information will be sent to Rx port)
Parameters	None
Example	MI,
Notes	Every command must have an end symbol (0x0D + 0x0A)

U: Initial MMC card

Prototype	MU,
Description	Initial MMC card or SD card.
Parameters	None
Example	MU,
Notes	Every command must have an end symbol (0x0D + 0x0A)

J: change current direction next direction

Prototype	MJ,dir_name
Description	change the current direction to next direction
Parameters	Dir_name: the name is next direction name
Example	Change current direction to Dir_A direction. MJ, Dir_A
Notes	Every command must have an end symbol (0x0D + 0x0A)

N: create a new direction

Prototype	MN,dir_name
Description	Create a new direction
Parameters	Dir_name: the new name
Example	Create a Dir_A direction. MN, Dir_A
Notes	Every command must have an end symbol (0x0D + 0x0A)

K: delete a direction

Prototype	MK,dir_name
Description	Delete a direction
Parameters	Dir_name: the new name
Example	delete a Dir_A direction. MK, Dir_A
Notes	Every command must have an end symbol (0x0D + 0x0A)

T: set date and time

Prototype	MT,year,month,day,hours,mins,seconds
Description	Sets the date/time stamp. Any subsequent file write operation will write this stamp to the currently assigned file's time/date attributes.
Parameters	• year: year attribute. Valid values: 1980-2107 • month: month attribute. Valid values: 1-12 • day: day attribute. Valid values: 1-31 • hours: hours attribute. Valid values: 0-23 • mins: minutes attribute. Valid values: 0-59 • seconds: seconds attribute. Valid values: 0-59
Example	MT, 2020,5,30,18,38,0
Notes	Every command must have an end symbol (0x0D + 0x0A)

C: create a file and write data to the file

Prototype	MC, x, file_name, data
Description	Create a file and write data or text to the file.
Parameters	• x = 0 not new line, x = 1 add return at end of string. • file_name: the new file name • data: data to be written.
Example	Create a new file and write text to the file. No new line. MC, 0, my_file, hello,world!
Notes	**Warn:** If the file exists and not empty its content will be erased. Every command must have an end symbol (0x0D + 0x0A)

A: append data to an exist file

Prototype	MA, x, file_name,data
Description	Open a file and append data or text to the file.
Parameters	• x = 0 not new line, x = 1 add return at end of string. • file_name: the file name • data: data to be written.
Example	Open a file and write text to the file. No new line. MA, 0, my_file, hello,world!
Notes	Every command must have an end symbol (0x0D + 0x0A)

D: delete an exist file

Prototype	MD, file_name
Description	Delete an exist file
Parameters	• file_name: the file name
Example	MD, my_file,
Notes	Every command must have an end symbol (0x0D + 0x0A)

F: format MMC SD Card

Prototype	MF, label
Description	Formats to **FAT16** MMC/SD card. WARNING: Formatting will erase ALL data on your MMC/SD card!
Parameters	• label: the file name
Example	MF, my_label
Notes	volume label (11 characters in length). If less than 11 characters are provided, the label will be padded with spaces. If null string is passed volume will not be labeled Every command must have an end symbol (0x0D + 0x0A)

L: load image from MMC SD card to LCD display

Prototype	ML, x,y,color, buffer#, image name
Description	L: Load an exist image from MMC SD card to a buffer and copy the buffer data to screen. I: Load an exist image from MMC SD card to a buffer and not copy the buffer data to screen.
Parameters	• x: x coordinate of the image start. • y: y coordinate of the image start • color color parameter. Valid values: 0 - 1 • buffer# • image name
Example	load monochrome bitmap name my_image, w = 256, h = 160 to LCD display. ML, 0,0,1,0,my_image
Notes	Every command must have an end symbol (0x0D + 0x0A) The module only support 1 bit BMP (monochrome bitmap), width <= 256, height <= 160.

E: Execute a Program in MMC Card.

Prototype	ME, File Name
Description	E: Execute a simple program in MMC card. This function can save more MCU Flash space.
Parameters	• File_Nmae = Customer program in MMC card.
Example	load a simple program from MMC card ME, my_file
Notes	Every command must have an end symbol (0x0D + 0x0A)

Y: Execute a Program in memory

Prototype	MY
Description	E: Execute a simple program in memory before loading
Parameters	
Example	Execute a simple program in memory before loading MY
Notes	Every command must have an end symbol (0x0D + 0x0A)

S: save screen image to MMC SD card.

Prototype	MS, buffer#, image_name,
Description	Save LCD display image to MMC SD card. The image size: width = 256, height = 160.
Parameters	• image_name: • buffer#
Example	save screen image to MMC SD card. MS, 0, my_image,
Notes	Every command must have an end symbol (0x0D + 0x0A)

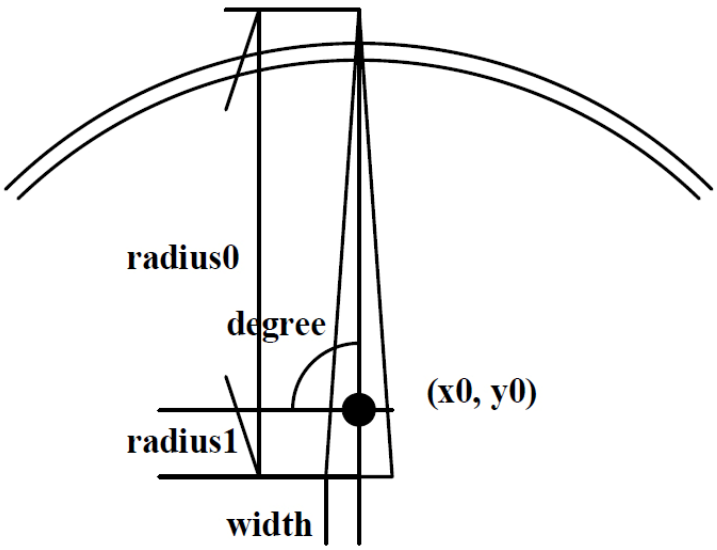
W: set waiting time (delay)

Prototype	MW,delay_#
Description	Set a waiting time
Parameters	• delay#: • 1 = 100ms • 2 = 200ms • 3 = 300ms • 4 = 400ms • 5 = 500ms • 6 = 1000ms • 7 = 1500ms • 8 = 2000ms
Example	MCU waiting 1000ms MS, 6
Notes	Every command must have an end symbol (0x0D + 0x0A)

Extension Command P: (Needle Function for meter and clock)

A: Draw a triangle needle to buffer and show it to screen

Prototype	PA,x_center, y_center, Radius0, radius1,width,degree,fill,color,buffer#
Description	A: Draw a triangle meter needle to buffer and copy the buffer data to screen. a: Draw a triangle meter needle to buffer and not copy the buffer data to screen.
Parameters	• x_center: x coordinate of needle center of rotation • y_center: y coordinate of needle center of rotation • radius0: needle length • radius1: needle end length • width: needle width • degree: degree • fill: fill parameter. Valid values: 0 - 1 (0 = not fill, 1 = fill) • color: color parameter. Valid values: 0 - 1 • buffer# buffer number parameter. Valid values: 0 - 5
Example	Create a new file and write text to the file. PA,128,20,100,10,3,90,0,1,0
Notes	Every command must have an end symbol (0x0D + 0x0A)



B: Draw a line needle to buffer and show it to screen

Prototype	PB,x_center, y_center, Radius0, radius1,size,degree,color,buffer#
Description	B: Draw a line meter needle to buffer and copy the buffer data to screen. b: Draw a line meter needle to buffer and not copy the buffer data to screen.
Parameters	• x_center: x coordinate of needle center of rotation • y_center: y coordinate of needle center of rotation • radius0: needle length • radius1: needle end length • size: line number. 1 - 2 • degree: degree • color: color parameter. Valid values: 0 - 1 • buffer# buffer number parameter. Valid values: 0 - 5
Example	Create a new file and write text to the file. PB,128,20,100,10,3,90,1,0
Notes	Every command must have an end symbol (0x0D + 0x0A)

Extension Command E: (Execute batch command)

Prototype	S
Description	This is Execute Batch Command. User can easy and fast to send more commands to the module at one time.
Parameters	S = Start, E = End
Example	S AC,0,1 P2,128,20,100,10,3,90,1,0 ….. E
Notes	Every command must have an end symbol (0x0D + 0x0A)

READ THE FOLLOWING TERMS AND CONDITIONS CAREFULLY

LIABILITY WARNING

This device should be used only for experimental purposes. It has NOT gone through extensive testing and it could erase or corrupt some or all data on media cards that are inside the device. You assume to take your own risk when you purchase this device, and release the responsibility and liability from the manufacturer with no harm.

REGULATORY WARNING

This device is intended solely for experimental purposes; it is not in finished product form and is NOT FCC approved. If you wish to install these modules into nonexperimental final finished products, you will be responsible to have the modules approved by the FCC at your own cost.

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