



Using the GLT240128:

Demo and Evaluation

Rev 2.0

Document revisions

Version	Date	Author	Remarks
1.0	10-Mar-09	Matrix Orbital	Initial Version
2.0	03-Nov-09	Matrix Orbital (RM)	References to 'GLT Evaluation Software' changed to 'GLT AppNote.exe Software'

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Introduction

This application note will demonstrate the features of the GLT240128.

The GLT240128 features a touch screen that adds the functionality of a dynamic soft keypad for the graphic 240x128 module. This feature eliminates the need for a physical keypad for cost savings and will add an updated touch to your application system.

There are two modes of operation with respect to the touch screen on the GLT240128:

- Region Mode
- Coordinate Mode

In Region Mode, the display module offers the ability to define up to 32 regions or area on the touch screen that can be touched to be used like a keypad. Some sample implementations would be:

- full QWERTY keypad (26 alphabet plus 6 more control keys) implementation
- menu tree control
- input control
- softkey / tab implementation
- calculator / number pad implementation
- tick boxes, etc

In Coordinate Mode, the display reports the x,y coordinates of the touch. A dragging threshold can also be set such that a minimum distance (in pixels) will have to be met before the x,y coordinates are reported. Some sample implementations would be:

- scroll / slide bars
- drawing

New Touch Screen Commands

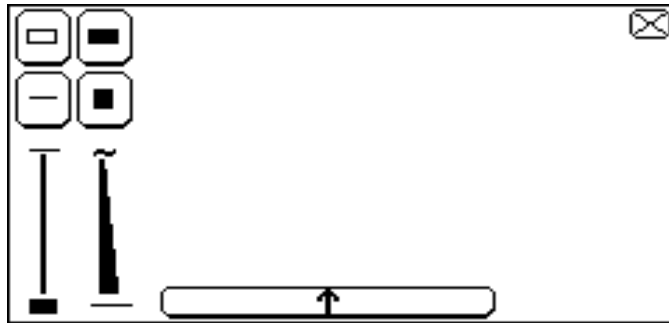
1. Set Touch Mode - Cmd 254/135
2. Set Dragging Threshold - Cmd 254/137
3. Set Reporting Mode - Cmd 254/136
4. Set Pressure Threshold - Cmd 254/138
5. Set Region - Cmd 254/132
6. Delete Region - Cmd 254/133
7. Delete All Regions - Cmd 254/134
8. Run Calibration - Cmd 254/139

Please see the manual for details.

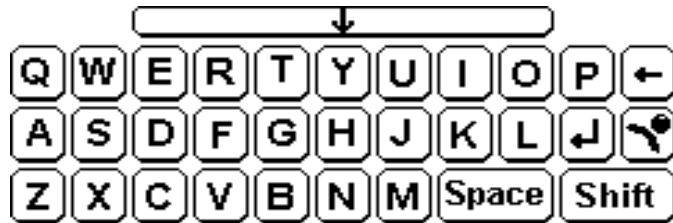
Testing the GLT240128 using the GLT App Note Software

This software will demonstrate the features of the GLT240128 touch screen display.

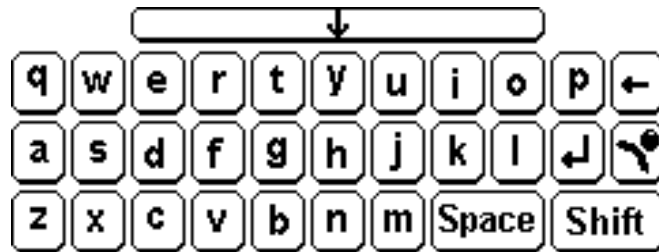
1. The following bitmaps are used with the App Note software. Upload them in the suggested id# locations on your display:
Drawing Tools.bmp to Id # 1 (size 240x128)



Keypad Upper Case.bmp to Id # 2 (size 240x90)



Keypad Lower Case.bmp to Id # 3 (size 240x90)



2. Upload the following font:
Small Filled in Id # 1




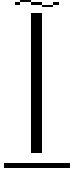
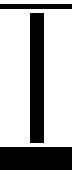



3. Download the GLT App Note.exe from the Matrix Orbital website [here](#).
Run the software.
4. The GLT App Note Software demonstrates the 2 modes of operation with the touch screen. Upon start up, the software will display bitmap # 1 (Drawing Tools.bmp) and put the display in coordinate mode.
5. In this mode, the software sends the following commands to initialize the touch screen:

Set Mode Command 254 / 135 / [mode]
254 / 135 / 1 – set to coordinate mode

Set Dragging Threshold Command 254 / 137 / [dragging threshold in pixels]
254 / 137 / 4

Set Drawing Colour Command 254 / 99 / [colour]
254 / 99 / 1

6. While in the coordinate mode, the user can chose any of the drawing tools and start playing with the touch screen display.

	Icon 1 - Rectangle tool	Start with a single point then drag to another point that will define the corners of the rectangle.
	Icon 2 - Filled Rectangle tool	
	Icon 3 - Line	Start with a single point then drag to another point that will define the endpoints of the line.
	Icon 4 - Dragging Threshold Slider	Use this tool to increase / decrease the dragging threshold (default is 4 pixels). Available thresholds using the slider are 2, 4 and 6 pixels.
	Icon 5 - Line Thickness Selector	When Line is selected, use this tool to chose the width of the line by dragging the square bar. Available thickness using the slider are 1, 3 and 5.
	Icon 6 - Colour Selector – White/Black (default is Black)	Both the line and the rectangle can be drawn in either black or white. Click on this tool to change the colour. This will affect the next drawing.
	Icon 7 - Open Qwerty keypad	When touched, the Qwerty keypad will display and the GLT will go into region mode. When in region mode, use this tool to go back to the drawing screen.
	Icon 8 - Close program	This will close the GLT App Note Software. This button is only available in the drawing window.

7. When the display is in coordinate mode, it will begin to report to the host when there is touch detected on the screen. Each report consists of 3 bytes:

<Movement><x><y>
<Movement> – pressed/down (0x01), moved (0x04), released/up (0x02)
<x,y> – coordinates

Eg. 0x01 33, 87 (pressed/down on 33, 87)
0x04 56, 102 (moved to 56, 102)
0x02 56, 102 (released/up on 56, 102)

Depending on the drawing tool is selected, the software determines from the reports the set of x,y coordinates that define a line or rectangle and send the appropriate command:

Draw Line Command 254 / 108 / [x1] / [y1] / [x2] / [y2]
Draw Rectangle 254 / 114 / [colour] / [x1] / [y1] / [x2] / [y2]
Draw Filled Rectangle 254 / 120 / [colour] / [x1] / [y1] / [x2] / [y2]

8. Start touching / tapping the screen and see the lines drawn (line tool selected) as your fingers move across the screen. Note that movements within the dragging threshold distance are not drawn. This is because the display will not report x,y coordinates within the dragging threshold of the last reported x,y position. The smaller the dragging threshold, the better the resolution will be for the lines, but in this case, the display might flood the host with too much data. In cases that resolution is not necessary, the dragging threshold can be set to something higher. For this application, use the Dragging Threshold Slider to change the dragging threshold. The default setting is 4 pixels, maximum and minimum are 6 and 2 respectively.
9. Region mode is entered using the Open Qwerty keypad tool. The upper case qwerty keypad is displayed on the screen. Here are the set of commands sent by the App Note Software to initialize the touch screen in region mode; and to define the regions.

Please note that the region definitions here are as per the specified bitmap. If a different bitmap is to be used, the values of the regions will be based on that bitmap and how they are displayed on the screen. For both the Keypad Upper Case and Lower Case.bmp files, the regions are set the same (the upper case is sent as the pressed / down value and the lower case is sent as the released / up value) because they use the same soft keys (x,y locations and width and height) also, they are displayed at the same area on the screen.

Set Mode Command 254 / 135 / [mode]
254 / 135 / 0 – set to region mode

Set Reporting Mode Command 254 / 136 / [reporting mode]
254 / 136 / 1 – report the down/pressed values

Delete all Regions Command 254 / 134
254 / 134 – delete all existing regions (we will be defining new ones)

Set Region Command
254 / 132 / [region #] / [x] / [y] / [w] / [h] / [press/down value] / [release / up value]

254 / 132 / 0 / 0 / 56 / 20 / 23 / 81 / 113 – definition of region 0 - 'Q' key
254 / 132 / 1 / 22 / 56 / 20 / 23 / 87 / 119 – definition of region 1 - 'W' key
254 / 132 / 2 / 44 / 56 / 20 / 23 / 69 / 101 – definition of region 2 - 'E' key
254 / 132 / 3 / 66 / 56 / 20 / 23 / 82 / 114 – definition of region 3 - 'R' key
...
254 / 132 / 10 / 220 / 56 / 20 / 23 / 8 / 8 – definition of region 10 - <- (backspace)
254 / 132 / 11 / 0 / 81 / 20 / 23 / 65 / 97 – definition of region 11 - 'A' key
254 / 132 / 12 / 22 / 81 / 20 / 23 / 83 / 115 – definition of region 12 - 'S' key
254 / 132 / 13 / 44 / 81 / 20 / 23 / 68 / 100 – definition of region 13 - 'D' key
...
254 / 132 / 20 / 198 / 81 / 20 / 23 / 10 / 10 – definition of region 20 - 'enter' key
254 / 132 / 21 / 220 / 81 / 20 / 23 / 178 / 178 – definition of region 21 - MO logo
254 / 132 / 22 / 0 / 106 / 20 / 23 / 90 / 122 – definition of region 22 - 'Z'
...

254 / 132 / 27 / 110 / 106 / 20 / 23 / 78 / 110 – definition of region 27 - 'N' key
 254 / 132 / 28 / 132 / 106 / 20 / 23 / 77 / 109 – definition of region 28 - 'M' key
 254 / 132 / 29 / 154 / 106 / 40 / 23 / 32 / 32 – definition of region 29 - spacebar
 254 / 132 / 30 / 198 / 106 / 40 / 23 / 179 / 179 – definition of region 30 - shift key
 254 / 132 / 31 / 44 / 40 / 152 / 22 / 180 / 180 – definition of region 31 - Open shift key
 Draw Saved Bitmap 254 / 98 / [bitmap #] / [x] / [y]
 254 / 98 / 2 / 0 / 40 – display bitmap 2 at 0,40

How to Get the Parameters for the Set Region Command:

-Open up the bitmap that contains the regions. Do this in Microsoft Paint

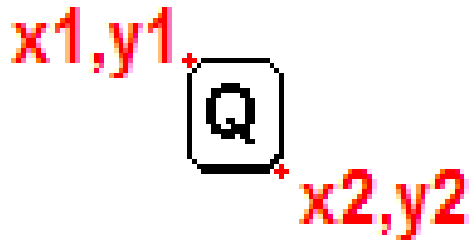
-Turn the grid on

- Place the selector tool on the top left corner of the region, the bottom right corner of Paint will indicate the x,y positions. Note these coordinates, these are the <x><y> parameters; or a certain offset is added to these values in the case the bitmap is not drawn from 0,0 as in the case here.

- Place the selector tool on the bottom right corner of the region. Note these coordinates. By subtracting the 2nd set of readings, you will get the <w><h> parameters

-The <pressed/down value> and <released/up value> depends on the application. In the Qwerty implementation, it is the upper and lower case of the key associated with the region, as in the keyboard for computers.

$w = x2 - x1$



$h = y2 - y1$

10. Start touching / tapping the keys on the screen and see the characters displayed on the top half of the display. Applications that need to receive certain character strings like passwords, id number, or operator name, etc. can make use of the Qwerty keypad implementation.

When a key is pressed, the GLT Touch Screen Eval software echoes the same character which then received by the display module as data/character to display.

11. The MO logo reports the value 0xB2 (178d) to the software. When this value is seen, the software clears the writing area of the screen by drawing a white rectangle on the area:

Draw Filled Rectangle Command 254 / 120 / [colour] / [x1] / [y1] / [x2] / [y2]
 254 / 120 / 0 / 1 / 1 / 238 / 39

12. The Shift key reports the value 0xB3. When this value is seen, the software toggles the bitmap displayed by sending the commands (alternately)

Draw Saved Bitmap Command 254 / 98 / [bitmap #] / [x] / [y]
 254 / 98 / 3 / 0 / 40 – display bitmap 3 at 0,40
 Set Reporting Mode Command 254 / 136 / [mode]
 254 / 136 / 2 – report the up/released values

-or-

Draw Saved Bitmap Command 254 / 98 / [bitmap #] / [x] / [y]
 254 / 98 / 2 / 0 / 40 – display bitmap 2 at 0,40
 Set Reporting Mode Command 254 / 136 / [mode]
 254 / 136 / 1 – report the down/pressed values

13. The '<->' key reports the value 0x08. This key can be used for backspace. Since the display does not do backspace, the software host will have to perform this task. It will need to know the size of the font currently used, as well as the font metrics, so that when a '<->' is reported by the display, the host will know to go back 1 font size back and reposition the imaginary cursor there and have the next character drawn in that spot.
14. The <enter> reports the value 0x0A and when echoed back to the display, the display goes to a new line (carriage return and line feed).
15. The <space> key reports the value 0x32 (space).
16. The Open Drawing Tool key reports the value 0xB4. When this value is seen, the software toggles the 'windows' or bitmap displayed and also reverts back to coordinate mode. Here are the commands used:

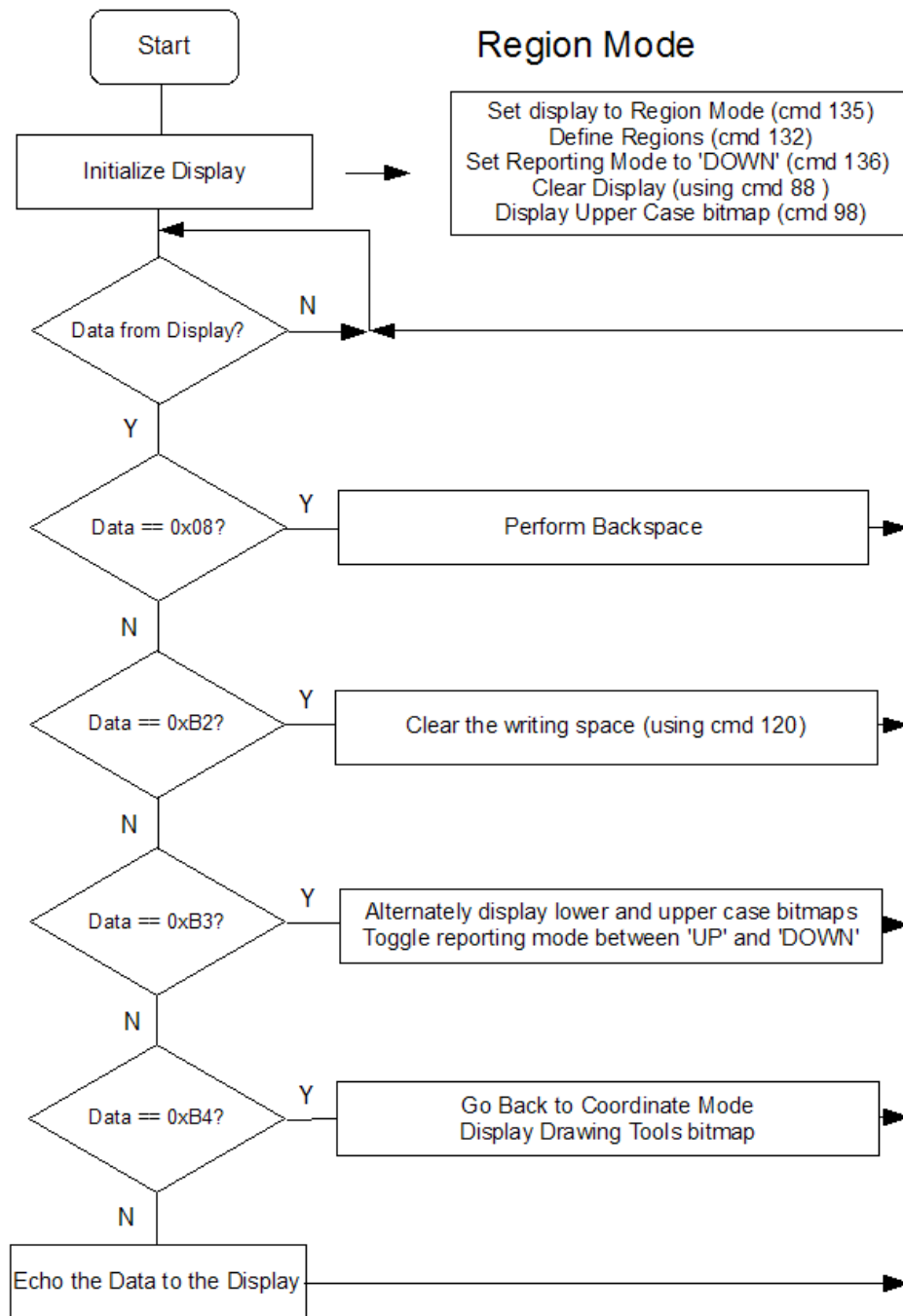
Draw Saved Bitmap Command 254 / 98 / [bitmap #] / [x] / [y]
254 / 98 / 1 / 0 / 0 – display bitmap 1 at 0, 0

Set Mode Command 254 / 135 / [mode]
254 / 135 / 1 – set to coordinate mode

Set Dragging Threshold Command 254 / 137 / <dragging threshold in pixels>
254 / 137 / [what was used last]

Set Drawing Colour Command 254 / 99 / [colour]
254 / 99 / [what was used last]

Flowcharts for the GLT App Note Software



Coordinate Mode

