



DGUS_SDK User Guide

(Ver4.9 2013.02)

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1 DGUS_SDK Instruction

1.1 Operation of DGUS_SDK

1. DGUS (DWIN Graphical Utility Software) is an intelligent GUI design software for DWIN DGUS LCM with K600+. By using DGUS, magnificent display effect can be achieved easily and rapidly with much less programming than ever before. Variables are defined by DGUS_SDK and users can feel free to design the visualize GUI. All parameters and images can be downloaded via SD card which stores related .bin files to make your design into real application.

2. Install DGUS_SDK_V4.9:

Unzip DGUS_SDK_V4.9.rar, and click DGUS_ToolV4.9.exe to run it.
.net Framework 2.0 is required to run the software).



3. Variable Definition

- ✧ **VP (Variable Pointer):** The addresses of variables in variable SRAM (56KB). Users can set buttons with defined VP, to change the value in this address and display contents corresponding with the value in VP address.
- ✧ **SP (Stack Pointer):** the address of definitions, starting address of description data of variables. Change the value in particular address to modify variable properties. Take <WordArt> function as example.

| Add. | Definition | Data Length | Description |
|------|---------------------|-------------|--|
| 0x00 | 0x5A03 | 2 | |
| 0x02 | *SP | 2 | Stack pointer, default setting is 0xFFFF. |
| 0x04 | 0x0007 | 2 | The whole process length (in terms of words). |
| 0x06 | 0x00 *VP | 2 | Variable pointer. |
| 0x08 | 0x01 X,Y | 4 | Top-left coordinate of text, left aligned. |
| 0x0C | 0x03 Icon0 | 2 | Icon ID corresponding to 0, the sequence is "0123456789-". |
| 0x0E | 0x04:H Icon_Lib | 1 | Address of icon file. |
| 0x0F | 0x04:L Icon_Mode | 1 | ICON display mode. 0x00: transparent, others: opaque. |
| 0x10 | 0x05:H Int_Num | 1 | Length of integer digits. |
| 0x11 | 0x05:L Dec_Num | 1 | Length of decimal digits. |
| 0x12 | 0x06:H VP_Data_Mode | 1 | 0x00: integer (2 bytes), 0x01: long integer (4 bytes). |

E.g.: If SP valued as 0x5000 for WordArt variable, VP parameter will be saved in the ADDRESS of 0x5000. Variable position parameters will be saved in 0x5001-0x5002

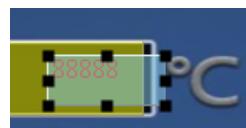
4. If you need to handle with icons, please drop icon files into Icon Generator to make icon file running in DGUS correctly.

5. How to select area for buttons & variables.

A. *Input coordinates directly.*



B. *Drag the button/variable with mouse.*



6. Define SP address for variables.

SP defines the description of variable settings; to reduce overlap of SP address is necessary. There is overlap judging embedded, Configuration files won't be created with failure message when it comes an overlap of SP address.

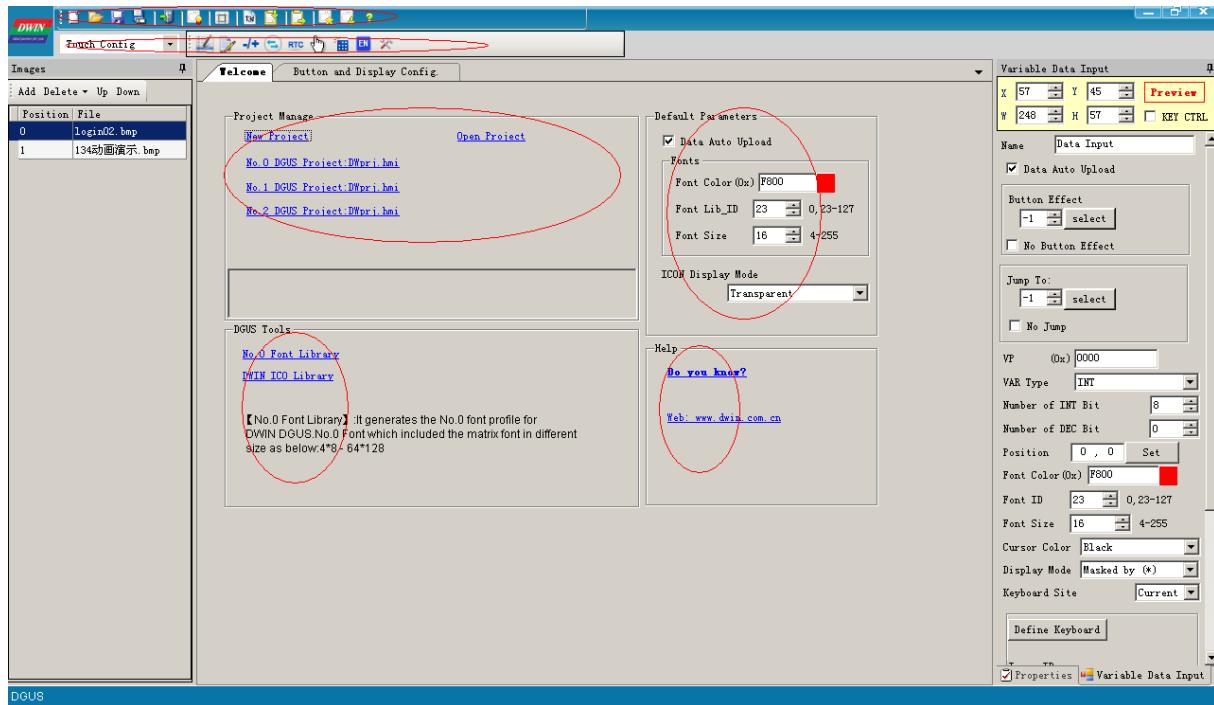


7. Import existing DGUS config. files into new project.

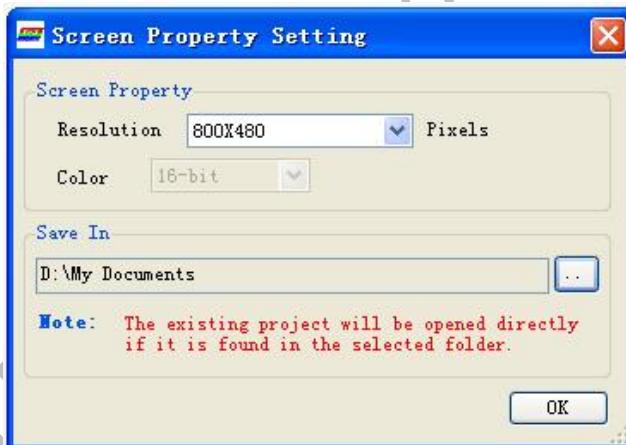
- A. Create a new project.
- B. Add pictures.
- C. Import config files.
- D. Copy icon files into <DWIN_SET> folder.

Note: Frame header is self-defined by users. In this document, A5 5A is taken as frame header for instance.

1.2 Main Interface of DGUS_SDK_V49



a) Click <New Project> to activate the window below:



b) Select resolution and path for your project.

Screen Property Set.

E.g. for:

DMT80480T070_06WT.

Color T: 16bit.

Resolution 80480: 800x480.

Navigation Bar:

| | |
|---------------------------|---|
| New | Create a new project. |
| Open | Open an existing project (.hmi file). |
| Save | Save the current project. |
| Save As | Save the current project in a new folder. |
| Close | Close the current project. |
| Resolution | Modify resolution of project. |
| System Properties | Modify system properties and save the settings in config.txt. Refer to illustration below |
| Create Config. | Generate <13Touch_Control_Config.bin> and <14Variable_Config.bin>. |
| Import Config. | Import existing config. files to the current project. |
| Variable Export | Generate <TouchConfig.xls> and <DisplayConfig.xls> for quick view of buttons & variables. |
| Align Left | Align the selected buttons and variables to left. |
| Align Top | Align the selected buttons and variables to right |
| Auto Width | Adjust the selected buttons & variables at same width. |
| Auto Height | Adjust the selected buttons & variables at same height. |
| Copy | (Ctrl + C): copy |
| Paste | (Ctrl + V): paste |
| Delete | (delete): delete |
| Front | Place the button or variable at front layer. |
| Back | Place the button or variable at backward layer. |
| SP Address Setting | Set SP for variables. |
| Variables Preview | Preview buttons & variables |
| Show Text | show the names of buttons & variables or not. |

Reference: *Inputted data will be sent via serial port only when both <TPSAUTO> in System Config. Window and <Data Auto Upload> settings in buttons properties are ticked.*



ToolBar:

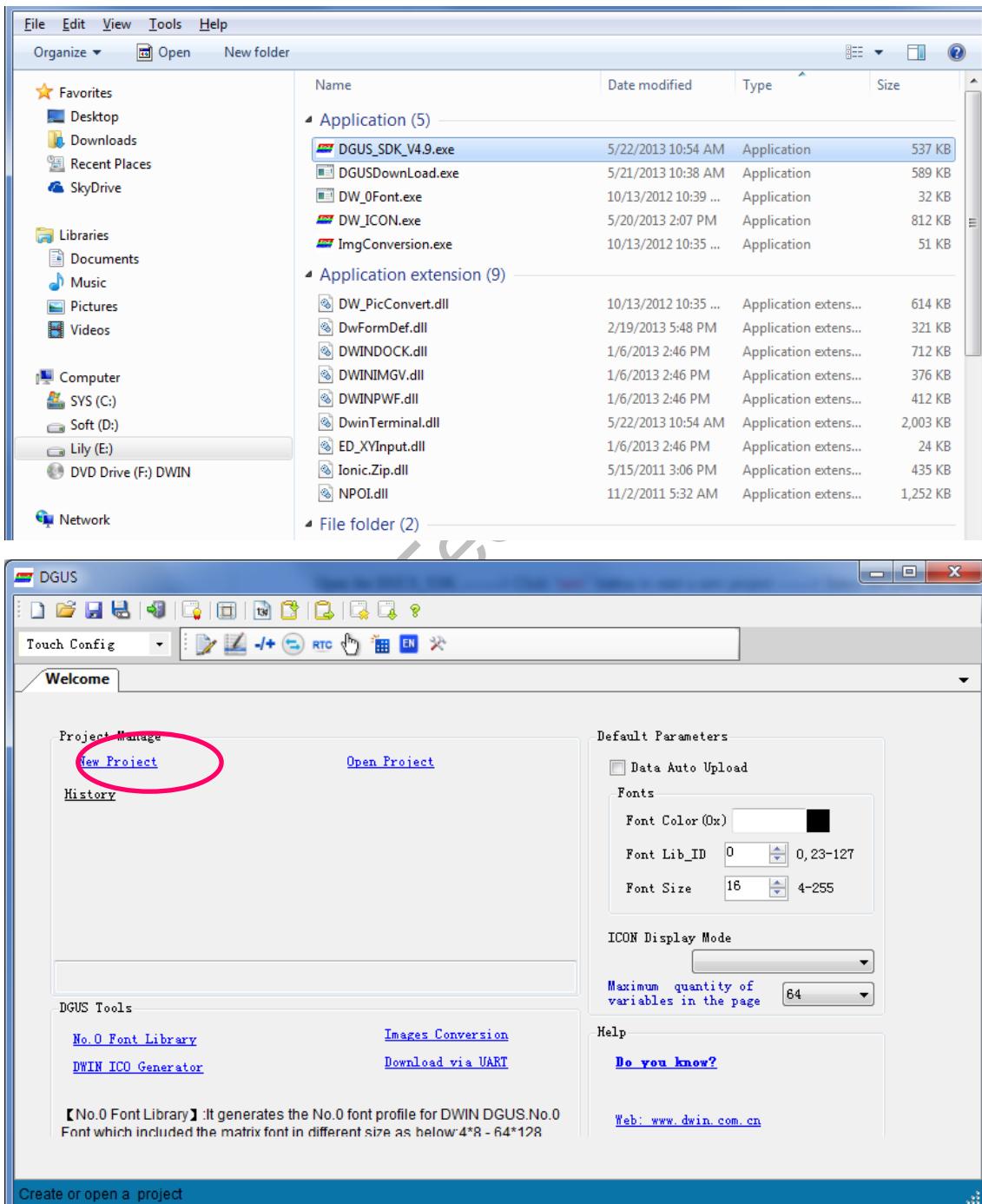
Switching between "Touch Config" & "Variable Config" & Edit Tools using Navigation bar, or shortcut key F2, F3,F4.

2 Basic Steps for DGUS_SDK Operation

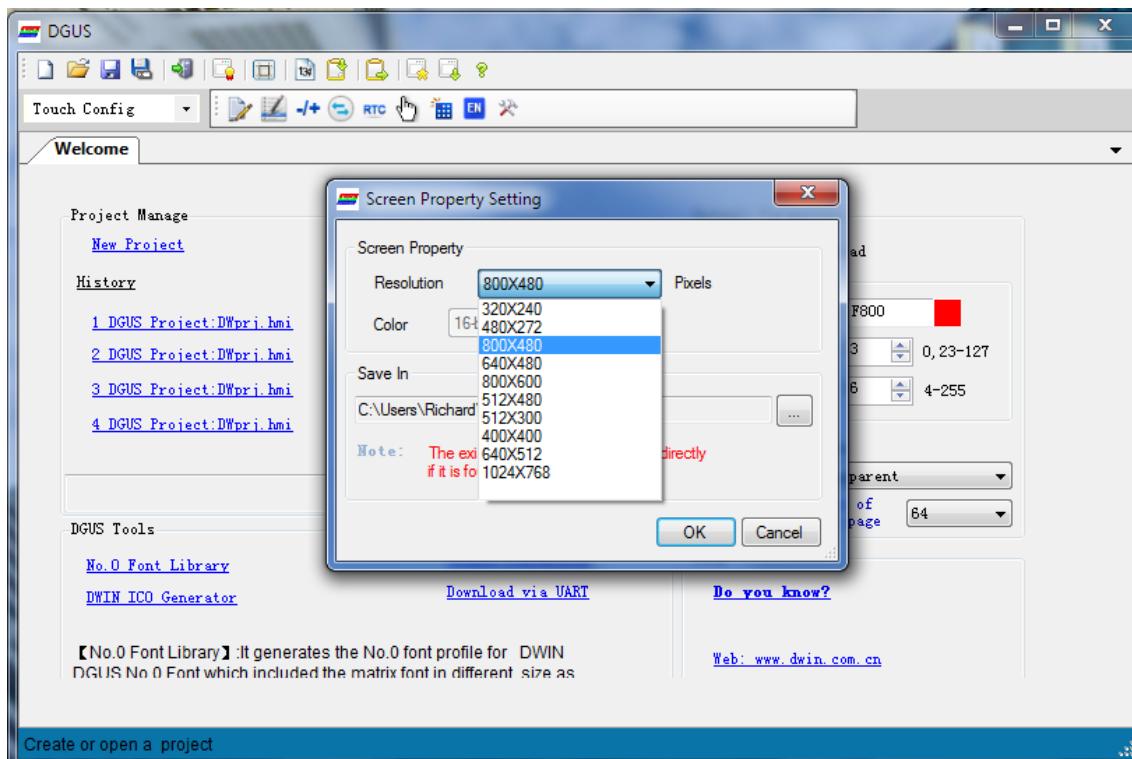
2.1 Create a new project

2.1.1 Start a new project

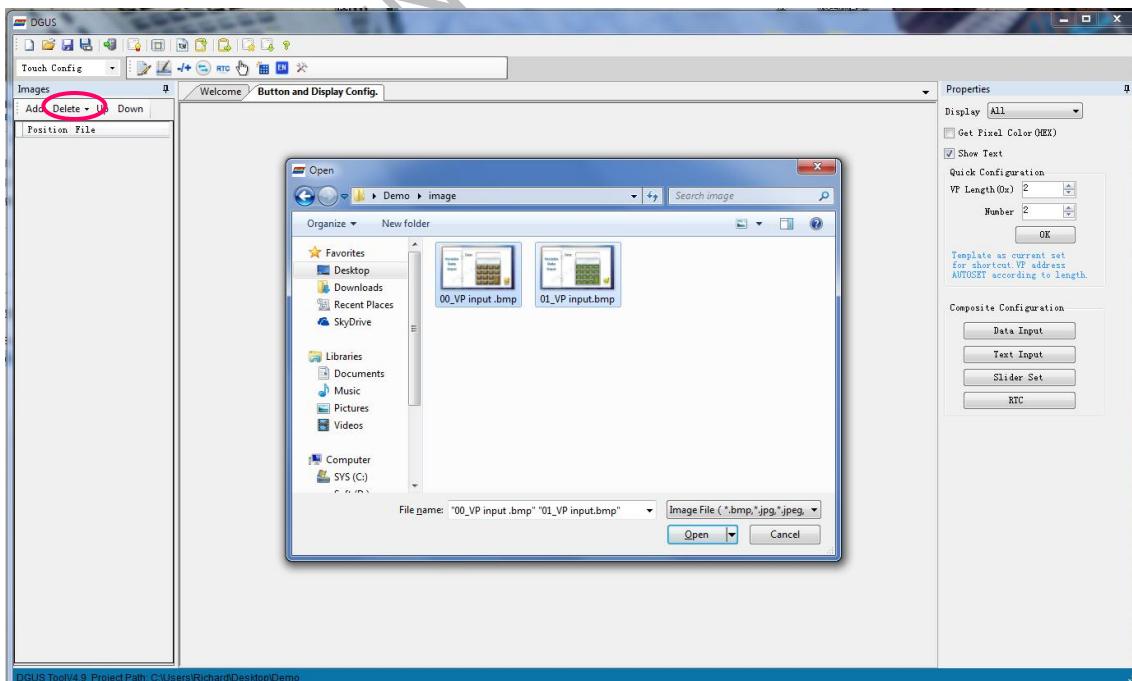
Open the DGUS_SDK_V49-----> Click “New Project” button to start a new project



2.1.2 Select corresponding resolution and save the path



2.1.3 Add images

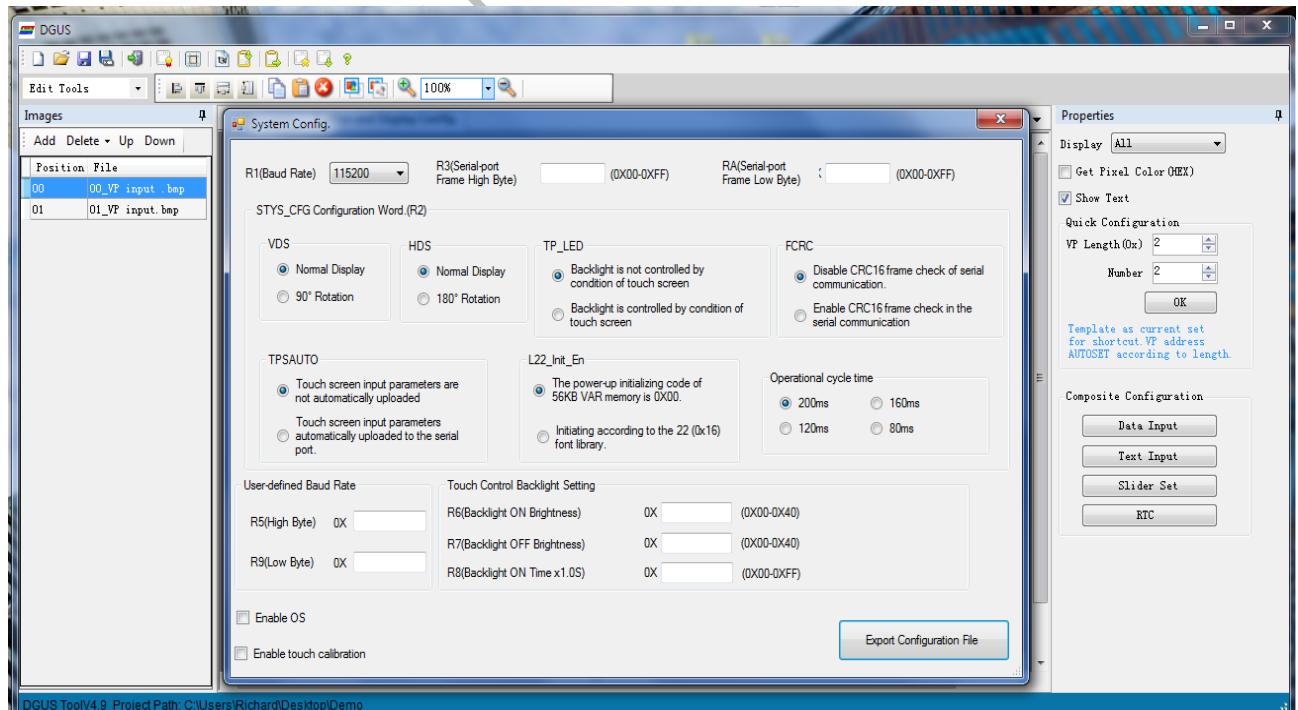


Images indicating here are what to be displayed as background with ".bmp" format required.
Image naming rules: ID + Name. bmp (name as optional)
For example, "0_Data Input.bmp" or "0.bmp"

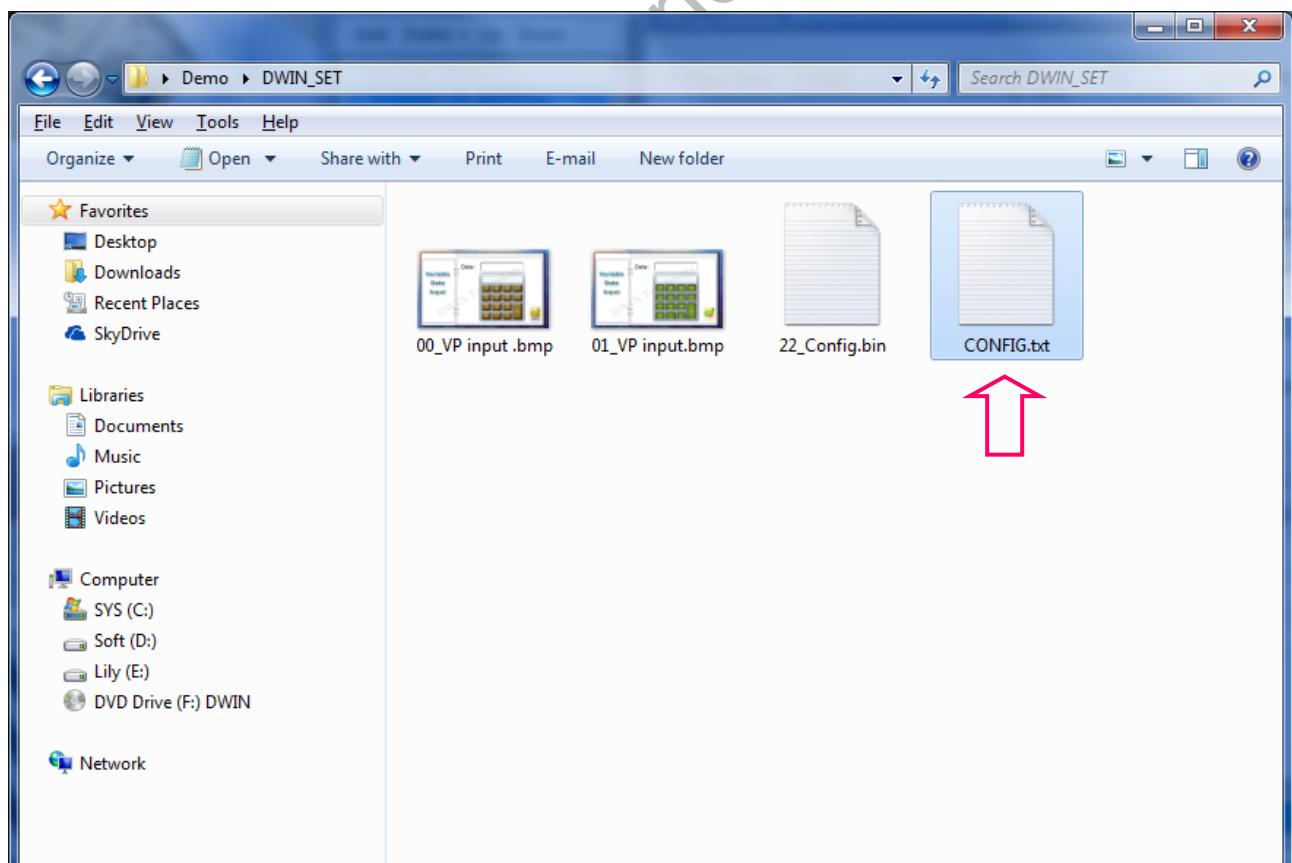
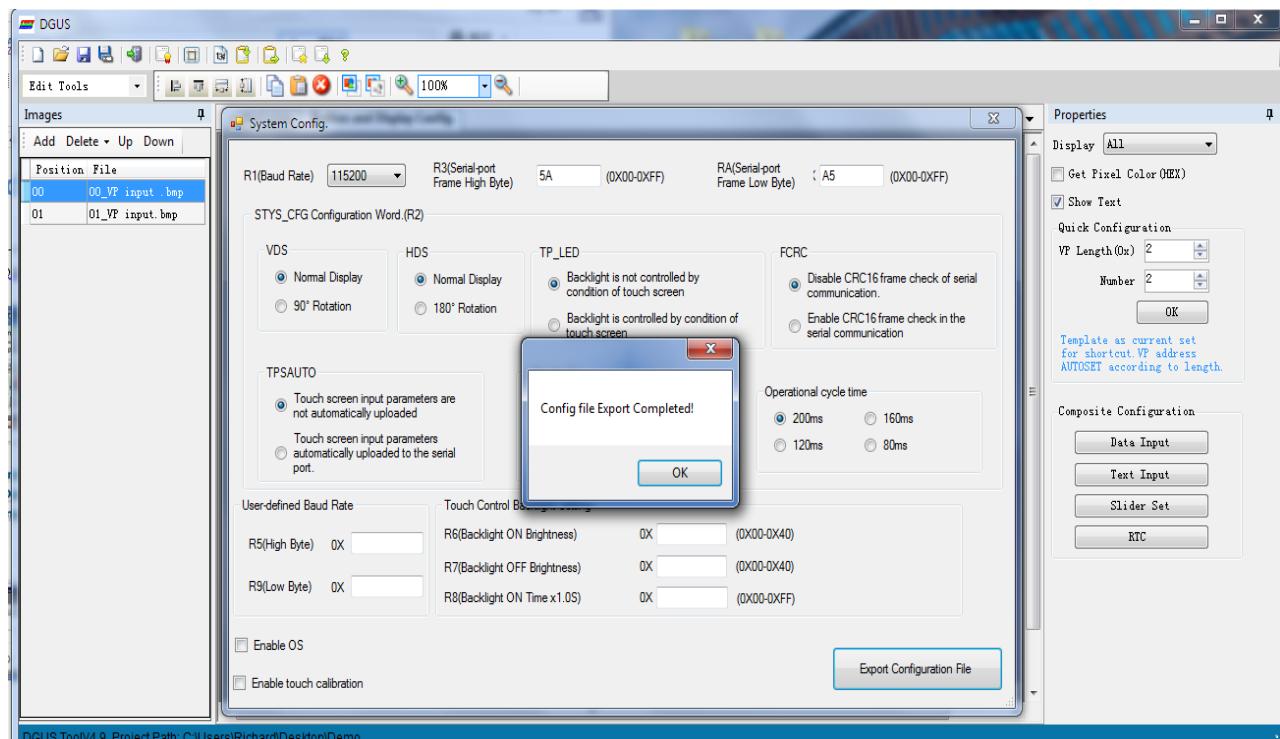


2.1.4 Create a CONFIG.TXT file for setting system parameters

Step into setting such system as baud rate, backlight, as well as cycle time etc.



Export Configuration File – “CONFIG. txt”



For the value and functions of each parameters, please refer to the chapter 1.2 of the [DGUS Dev. Guide_V3.4—CONFIG. TXT](#)

| Name of Parameter Register | Range | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-----------|---|------|------|--------|--------|--------|--------|---------|------|------|------|-----------|------|------|------|------|-------|-------|-------|--------|-------|----|------|------|------|------|------|------|------|------|------|-----------|-------|-------|------|------|--------|--------|--------|--------|---------|
| R0 | Depends | Module driver mode, unnecessary for modification which may cause errors. Do not configure it. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| R1 | 0x00-0x11 | Baud rate setting, 0x00-0x10 matchup with 1200bps — 921600bps. <table border="1" data-bbox="635 449 1365 550"> <tr><td>R1</td><td>0x00</td><td>0x01</td><td>0x02</td><td>0x03</td><td>0x04</td><td>0x05</td><td>0x06</td><td>0x07</td><td>0x08</td></tr> <tr><td>Baud rate</td><td>1.2K</td><td>2.4K</td><td>4.8K</td><td>9.6K</td><td>19.2K</td><td>38.4K</td><td>57.6K</td><td>115.2K</td><td>28.8K</td></tr> <tr><td>R1</td><td>0x09</td><td>0x0A</td><td>0x0B</td><td>0x0C</td><td>0x0D</td><td>0x0E</td><td>0x0F</td><td>0x10</td><td>0x11</td></tr> <tr><td>Baud rate</td><td>76.8K</td><td>62.5K</td><td>125K</td><td>250K</td><td>230.4K</td><td>345.6K</td><td>691.2K</td><td>921.6K</td><td>Defined</td></tr> </table> | R1 | 0x00 | 0x01 | 0x02 | 0x03 | 0x04 | 0x05 | 0x06 | 0x07 | 0x08 | Baud rate | 1.2K | 2.4K | 4.8K | 9.6K | 19.2K | 38.4K | 57.6K | 115.2K | 28.8K | R1 | 0x09 | 0x0A | 0x0B | 0x0C | 0x0D | 0x0E | 0x0F | 0x10 | 0x11 | Baud rate | 76.8K | 62.5K | 125K | 250K | 230.4K | 345.6K | 691.2K | 921.6K | Defined |
| R1 | 0x00 | 0x01 | 0x02 | 0x03 | 0x04 | 0x05 | 0x06 | 0x07 | 0x08 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Baud rate | 1.2K | 2.4K | 4.8K | 9.6K | 19.2K | 38.4K | 57.6K | 115.2K | 28.8K | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| R1 | 0x09 | 0x0A | 0x0B | 0x0C | 0x0D | 0x0E | 0x0F | 0x10 | 0x11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Baud rate | 76.8K | 62.5K | 125K | 250K | 230.4K | 345.6K | 691.2K | 921.6K | Defined | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| R2 | 0x00-0xFF | SYS_CFG configuration byte. Refer to the following table. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| R3 | 0x00-0xFF | UART_SYNC_H, High byte of frame header. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| R4 | | Module driver mode, unnecessary for modification which may cause errors. Do not configure it. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| R5 | 0x00-0xFF | When R1=0x11, high byte of baud rate configuration. R5:R9=625000/user-defined baud rate. E.g.: set baud rate as 10000bps, R5:R9=6250000/10000=625=0x0271, R5=0x02, R9=0x71. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| R6 | 0x00-0x40 | Brightness of backlight. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| R7 | 0x00-0x40 | Brightness of backlight in sleep mode. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| R8 | 0x01-0xFF | Time before sleep mode. activation | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| R9 | In Flux | When R1=0x11, low byte of baud rate configuration. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RA | 0x00-0xFF | UART_SYNC_L, Low byte of frame header. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RC | In Flux | AUX_CFG Configuration. Refer to the following table. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| All parameters should be 2-digit hexadecimal numbers, for example 0A indicates 10 in decimal base. Two bytes are must, for example 00 is not allowed to write as 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

➤ R2 (SYS_CFG configuration Byte)

| Bit | Ratio | Definition | Description | | | | | | | | | | | | | | | |
|-------|-------|-------------|---|-------|------|-------|-------|-------|------|---|---|---|---|------|---|---|---|---|
| .7 | 0x80 | VDS | 0=Normal display. 1=90° Rotation. | | | | | | | | | | | | | | | |
| .6 | 0x40 | HDS | 0=Normal Display. 1=180° Rotation (upside down). | | | | | | | | | | | | | | | |
| .5 | 0x20 | TP_LED | 0=Brightness can't be changed via screen clicking 1=Brightness can be changed via screen clicking, the parameters set up in R6, R7,R8 | | | | | | | | | | | | | | | |
| .4 | 0x10 | FCRC | 0=Disable CRC16 checksum in the serial communication. 1= Enable CRC16 checksum in the serial communication | | | | | | | | | | | | | | | |
| .3 | 0x08 | TPSAUTO | 0=Disable auto-upload of key code or data. 1=Enable auto-upload of key code or data. | | | | | | | | | | | | | | | |
| .2 | 0x04 | L22_Init_En | 0=Initialize 56KB access variable data to 0x00. 1=Initialize 56KB access variable data from 22*.bin. | | | | | | | | | | | | | | | |
| .1 | 0x02 | FRS1 | Set the cycle of DGUS, the smaller number will shorten response time for variable display, but reduce the efficiency of data processing. <table border="1" data-bbox="619 1605 1429 1684"> <tr><td>Cycle</td><td>80mS</td><td>120mS</td><td>160mS</td><td>200mS</td></tr> <tr><td>FRS1</td><td>1</td><td>1</td><td>0</td><td>0</td></tr> <tr><td>FRS0</td><td>1</td><td>0</td><td>1</td><td>0</td></tr> </table> | Cycle | 80mS | 120mS | 160mS | 200mS | FRS1 | 1 | 1 | 0 | 0 | FRS0 | 1 | 0 | 1 | 0 |
| Cycle | 80mS | 120mS | 160mS | 200mS | | | | | | | | | | | | | | |
| FRS1 | 1 | 1 | 0 | 0 | | | | | | | | | | | | | | |
| FRS0 | 1 | 0 | 1 | 0 | | | | | | | | | | | | | | |
| .0 | 0x01 | FRS0 | For the resolution 1024*768, recommended set the cycle upon 120mS. The cycle influence the speed of Animation Icon display. | | | | | | | | | | | | | | | |

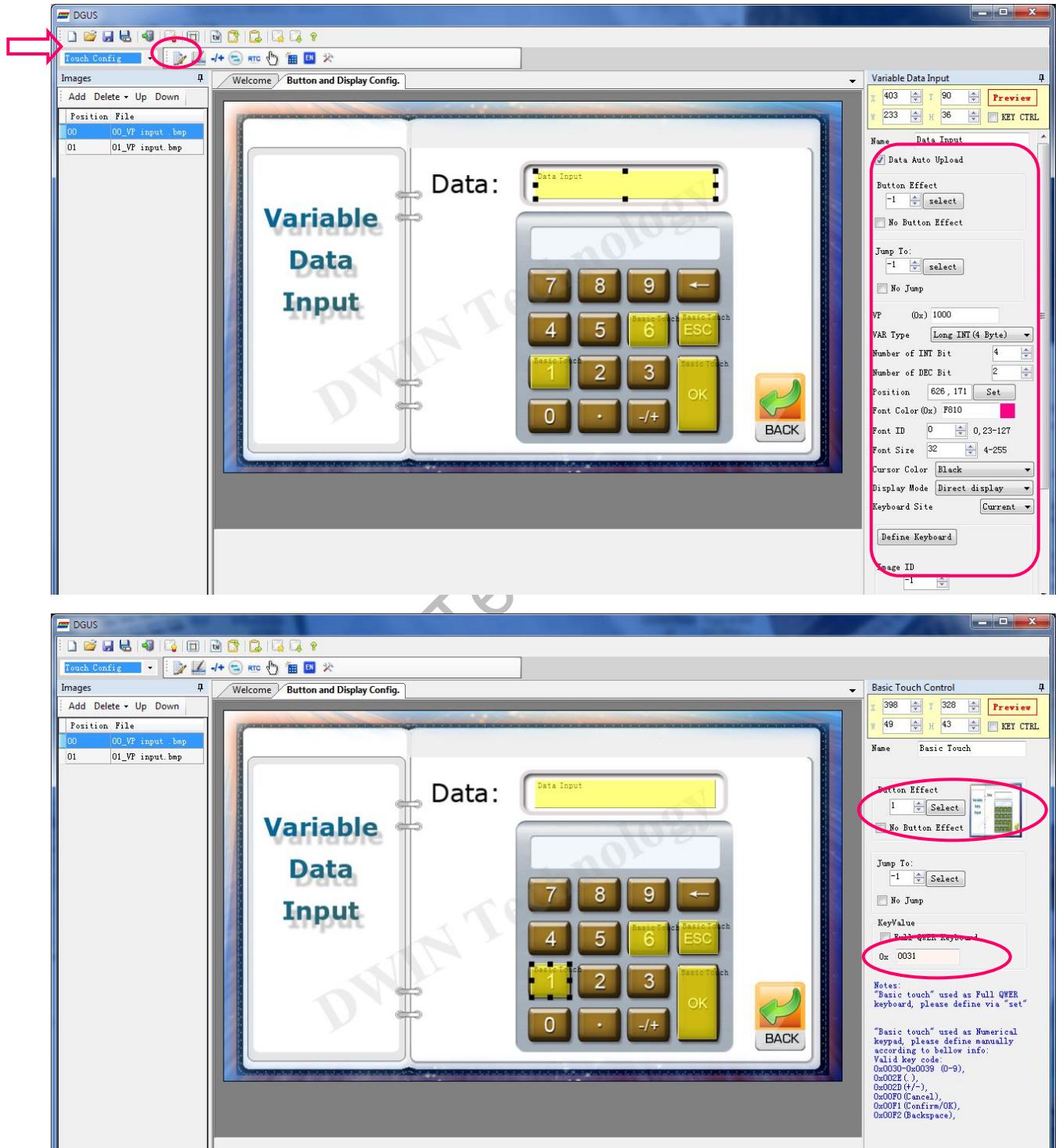
If the frame header is set as R3=5A RA=A5, please use the software "Serial debugging assistant sscom32" sending command below for verifying all images works fine. [5A A5 04 80 03 00 01\(00 01 signify images switching to No1.\)](#)

Later, check if images No1 switched successfully. (format must be .bmp naming started from "00").

There are config.txt failed or com port out of work in the event of images switch failure. Please affirm parameter for config.txt again including frame header, baud rate etc.

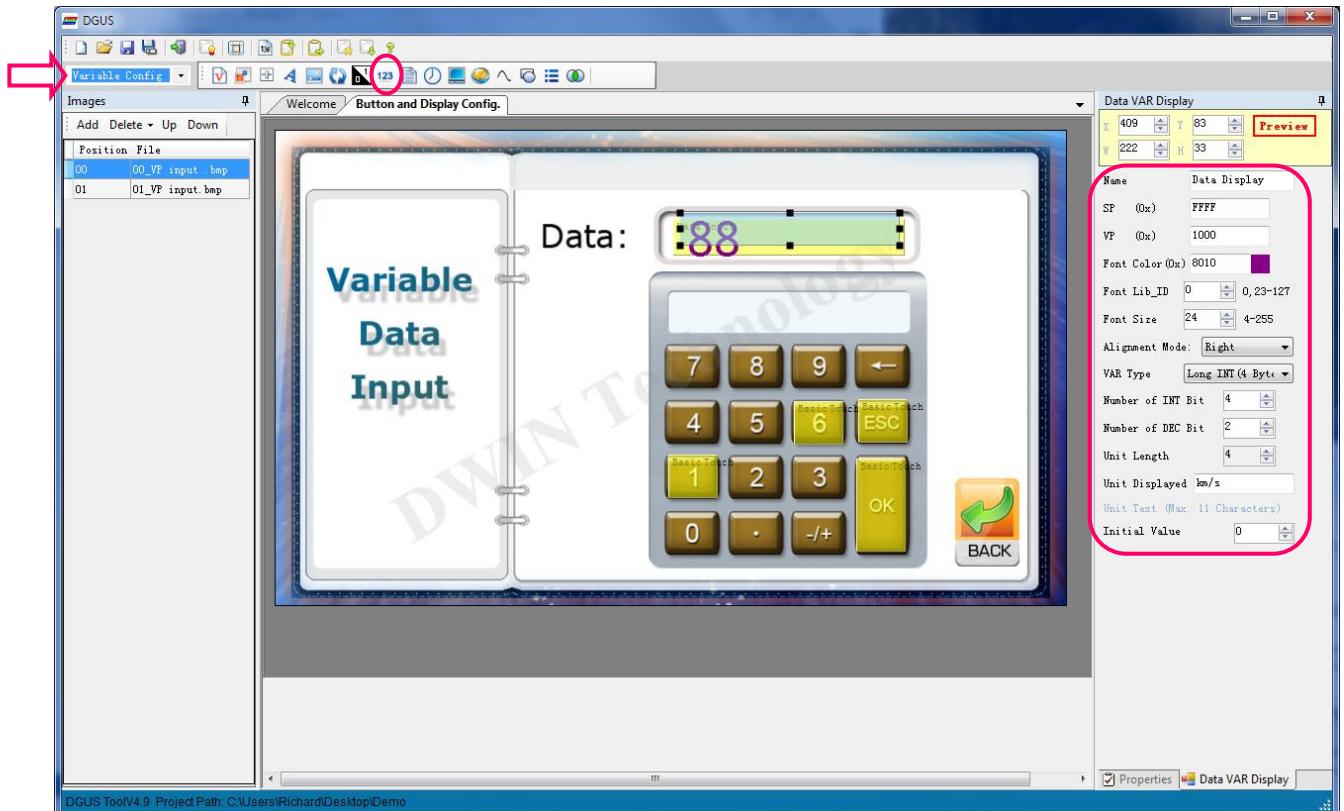
2.2 Configure touch functions

Select the “Touch Config” from pull-down menu-----> Add touch function, as “Data Input”
-----> Drag a square on your button as follow yellow area -----> Set the properties, such as
button effect, key value, etc.



2.3 Configure variable display

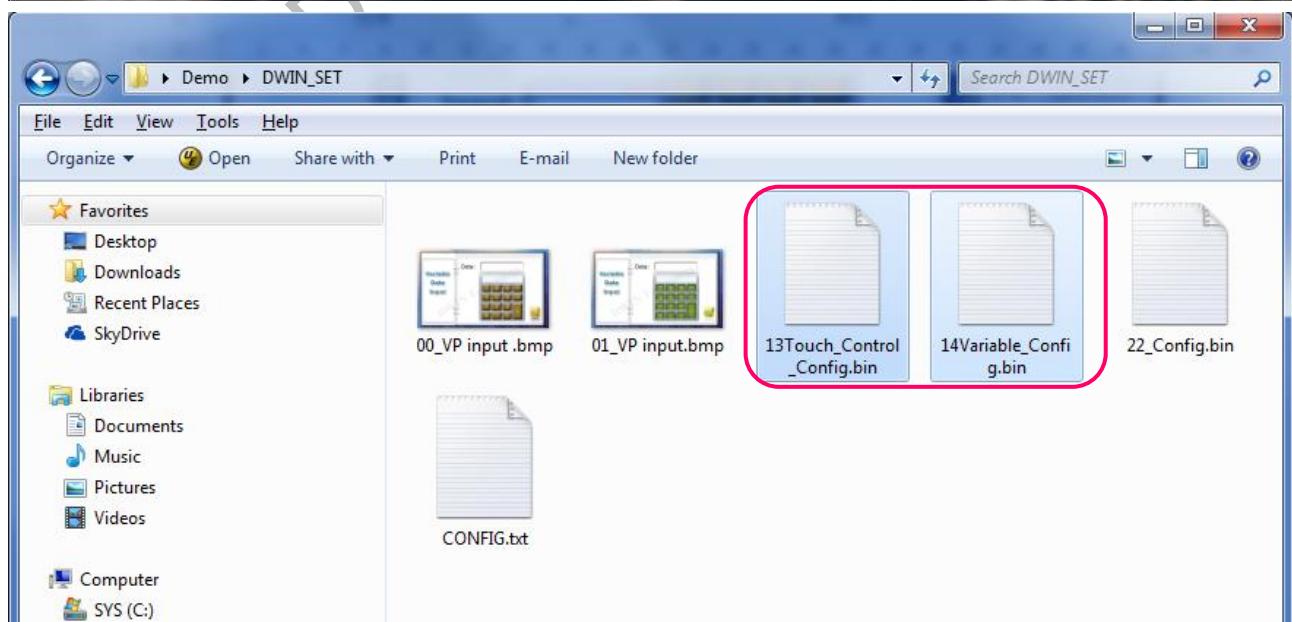
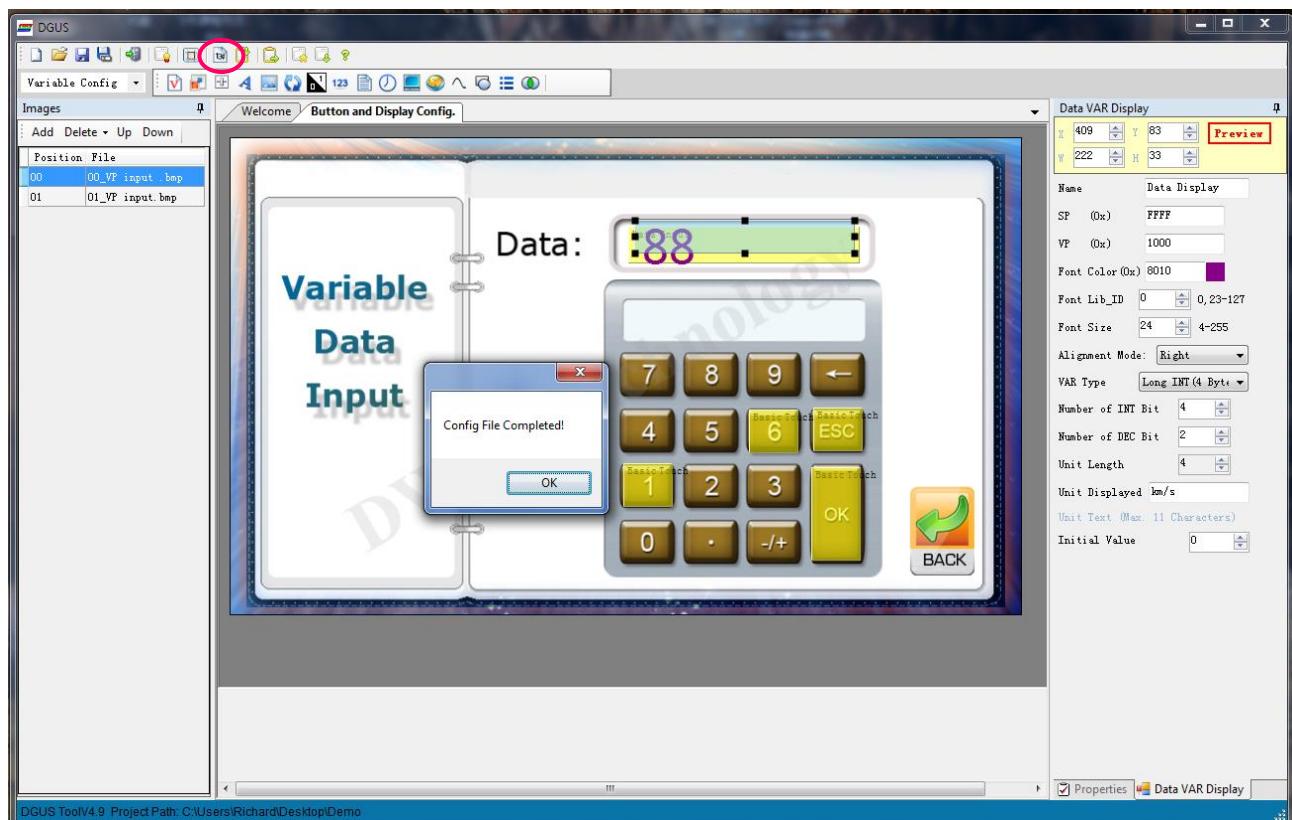
Select the “Variable Config” from pull-down menu -----> add the display function, as “Data Variable” ----->Drag a blue square on area, the variable will be displayed based on the upper-right coordinates.-----> Set the properties of variable as font color, font ID



2.4 Create configuration files

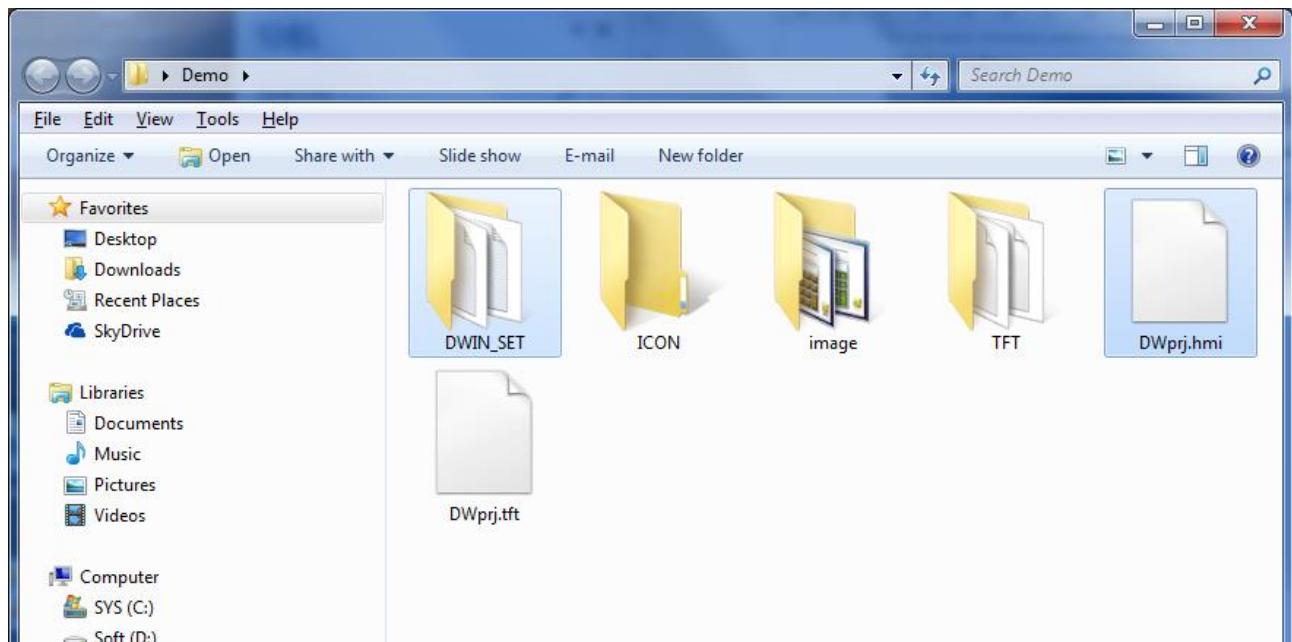
Click the “Generating Configuration File” button, it will create a touch control configuration file and a variable configuration file. Their default file names are “**13Touch_Control_Config.bin**” and “**14Variable_Config.bin**” which cannot be renamed. Or the project can’t be opened properly.

Please note that 13&14 bin file must be dropped in corresponding DWIN_SET folder if file downloaded via UART, otherwise pop-up red notice will show up warning correct file are not found.



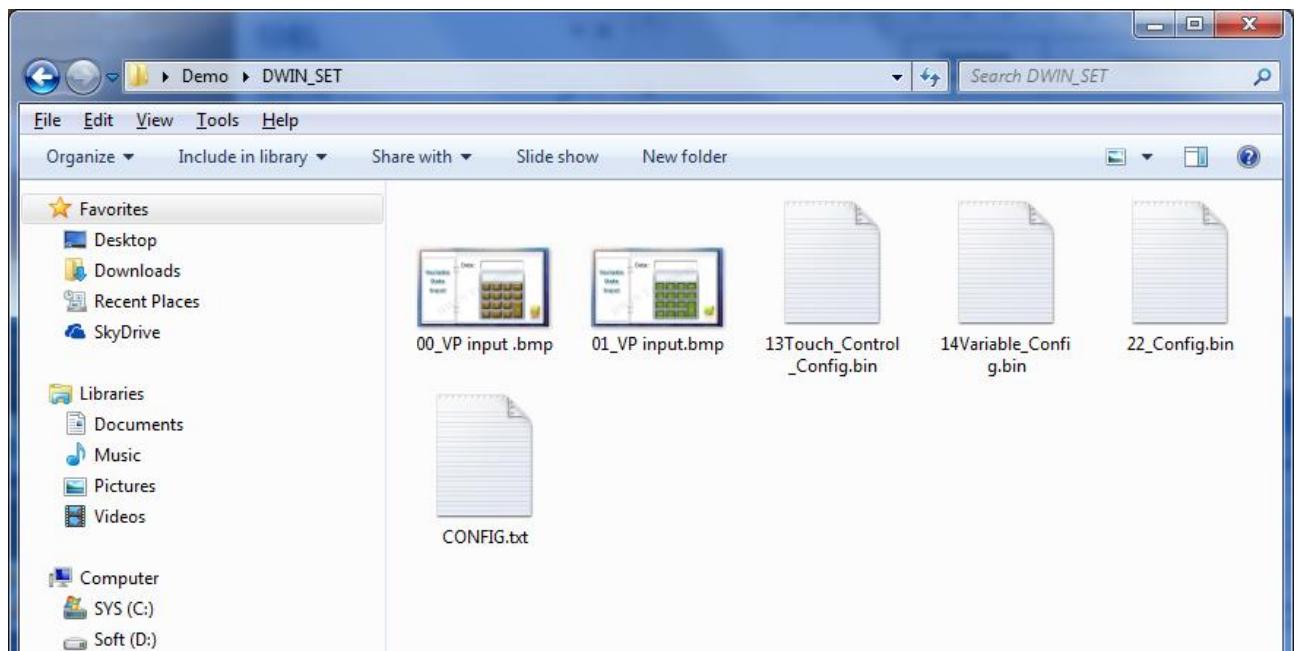
2.5 Download

When you completed above steps, it will create a **DWIN_SET** folder and a project named **DWprj.hmi** in the path you selected before.



The DWIN_SET folder includes as follow:

| File Type | Naming Rule | Example | Description |
|--------------------------|---|-------------------------------------|--|
| Pictures | Picture ID+ (optional) file name.BMP | 00_starting page.BMP | 24-bit BMP pictures with same resolution of DWIN module are required |
| Fonts | Font ID+ (optional) file name.BIN/DZK/HZK | 32_ASCII.DZK | Generated by the Font Generator |
| Icon Library | Icon file ID+ (optional) file name.ICO | 41_iconlibrary.ICO | Generated by DWIN Toolbox "DWICON" |
| Default ASCII | 0*.HZK | 0_DWIN_ASC.HZK | Generated by DWIN Toolbox "No.0 font library". |
| Touch configuration | 13*.BIN | 13_touch configuration file.BIN | Generated by DWIN DGUS software |
| Variable configuration | 14*.BIN | 14_variables configuration file.BIN | Generated by DWIN DGUS software |
| Variables Initialization | 22*.BIN | 22_Initialization.BIN | |
| User Code | 23*.BIN | 23_Water_Treatment.BIN | |
| Hardware settings | CONFIG.TXT | CONFIG.TXT | |



Copy the DWIN_SET folder into the SD card root directory -----> Powered on DGUS LCM-----> Insert SD card into the slot of LCM, the configuration files will be downloaded automatically.

Note: During downloading, don't turn off the LCM, the screen will blink to blue then back to the first image after completion

3. Main Functions of DGUS_SDK

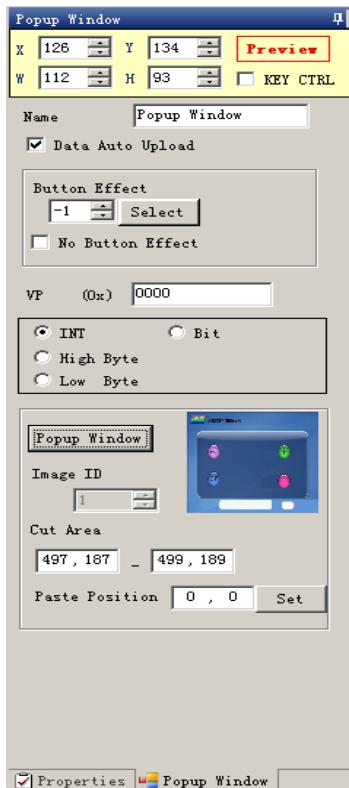
Touch Config : users can use DGUS_SDK software to add buttons on screen, including Popup Window, Variable Data Input, Incremental Adjustment, Slider Adjustment, RTC Setting, Touch Control, Return Key Code, and ASCII Input. Buttons are shown as yellow rectangles in DGUS_SDK_V4.9. Users can also add press effect for buttons.

Variable Config : users can use DGUS_SDK to add variables on screen, including Variable Icon, Animation Icon, Slider, WordArt, Image Animation, Icon Rotation, Data Variable, Text Display, RTC Display, Analog Clock Display, Dynamic Trend Curve Display, Table Display, and Basic Graphic Display, Bit Icon, Timer Variable. Variables are shown as light-blue rectangles in DGUS_SDK_V49.

Parameter settings: users can use <System Properties> to adjust parameter settings of DGUS module. Parameter with “0x” in front should be filled with hex numbers.

3.1 Touch Config.

3.1.1 Popup Window



Selected Area: selected button area.

Preview: preview button effect.

Name: name this button for viewing it in .xls (Excel) file.

Data Auto Upload: after pressing the button, key code auto sent to serial port.

Button Effect: set picture ID for touching effect, -1: null.

VP: variable pointer.

VAR Type:

INT: write key code in VP address (word).

High Byte: write low byte of key code in high byte of VP.

Low Byte: write low byte of key code in low byte of VP.

Bit: write data from last bit of key code into designated bit of VP address. (0x10 corresponds to VP.0, 0x1F corresponds to VP.F).

Popup Window: set window picture ID and window area.

Image ID: image ID of window picture.

Cut Area: cut area in image ID.

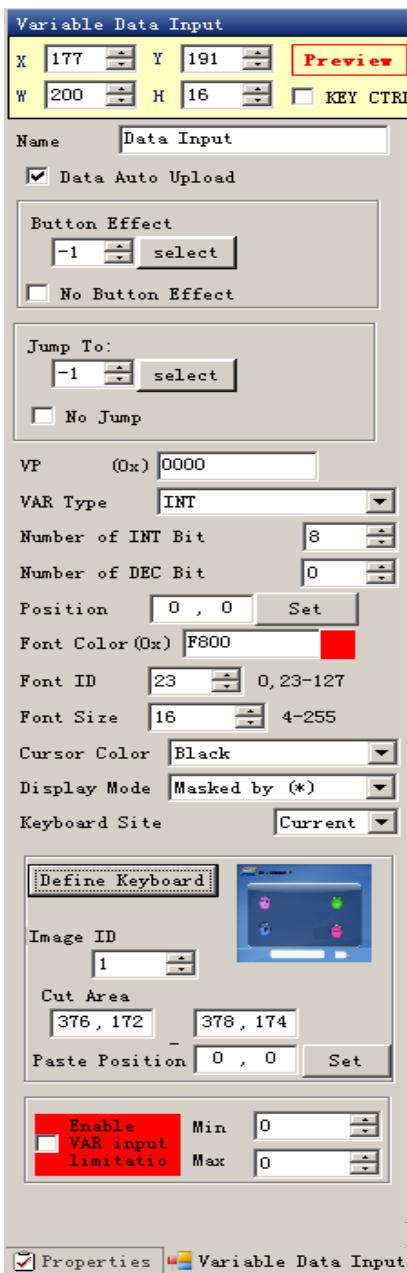
Paste Position: position of window on current screen.

Note: Only <Touch Control> buttons will work on popup window.

Illustration of button <Popup Window>:



Click <Stop> button - Window pops up - Select YES/NO.



3.1.2 Variable Data Input

Selected Area: selected button area.

Preview: preview button effect.

Name: name this button for viewing it in .xls file.

Data Auto Upload: after pressing the button, key code auto sent to serial port.

Button Effect: set picture ID for touching effect, -1: null.

Jump To: switch to a new picture after pressing.

VP: variable pointer.

VAR Type:

INT: integer.

LONGINT: long integer.

High byte: high byte in VP address.

Low byte: low byte in VP address.

Number of INT Bit: length of integer digits.

Number of DEC Bit: length of decimal digits.

Position: data position when typing.

Font Color: data color when typing.

Font ID: address of ASCII font file.

Font Size: horizontal pixel numbers.

Cursor Color: white/black cursor.

Display Mode: masked by (*)/direct display.

Define Keyboard:

Set the keyboard picture ID and the keyboard area.

Image ID: image ID of the keyboard area.

Cut Area: cut area in image ID.

Paste Position: position of the keyboard on current screen.

Enable VAR Input Limitation:

Set limits for inputting numbers.

Notes: Only <Touch Control> buttons will work on keyboard:

0x00F1 (Confirm), 0-9 corresponds to 0x0030 - 0x0039, 0x00F0 (Cancel), 0x00F2 (Backspace), 0x002D (+/-), 0x002E (.).

Ignore decimal point while setting range restriction for return value. E.g.: the setting is 3 integer bits and 2 decimal bits, and then the top limit is 10000, rather than 100.

Inputted data can be displayed by <Data Variable>, <WordArt> etc.

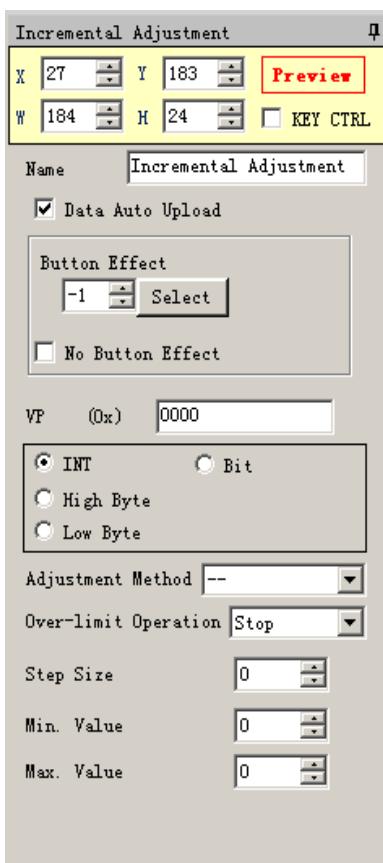
Illustration of button <Variable Data Input>:



Click text – Keyboard pops up – Type data – OK.

Click <Cancel> to interrupt input.

3.1.3 Incremental Adjustment



Selected Area: selected button area.

Preview: preview button effect.

Name: name this button for viewing it in .xls file.

Data Auto Upload: after pressing the button, key code auto sent to serial port.

Button Effect: set picture ID for touching effect, -1: null.

VP: variable pointer.

VAR Type:

0x00: integer.

0x01: high byte in VP address.

0x02: low byte in VP address.

0x10 – 0x1F: adjust value in designated bit of VP address. (0x10 corresponds to VP.0, 0x1F corresponds to VP.F) **Step Size must be 0 or 1.**

Adjustment Method: +-/-.

Over-limit Operation: stop/ cycle.

Step Size: set step size for +/- buttons.

Min. Value: minimum value for adjustment.

Max. Value: maximum value for adjustment.

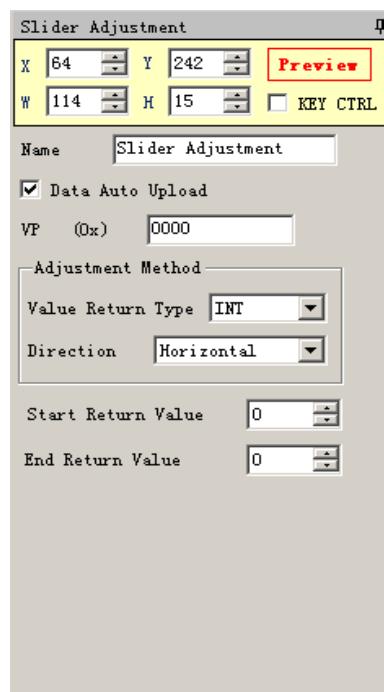
Adjusted data can be displayed by <Data variable>, <Icon variable> and <WordArt> etc.

Illustration of button <Incremental Adjustment>:



Click <+> or <-> to adjust corresponding value.

Hold the button to adjust continually.



3.1.4 Slider Adjustment

Selected Area: selected button area.

Preview: preview button effect.

Name: name this button for viewing it in .xls file.

Data Auto Upload: after pressing the button, key code auto sent to serial port.

VP: variable pointer.

Value Return Type:

0x00: integer.

0x01: high byte in VP address.

0x02: low byte in VP address.

Direction: horizontal/vertical.

Start Return Value:

The value corresponding to left/top side of slider.

End Return Value:

The value corresponding to right/bottom side of slider.

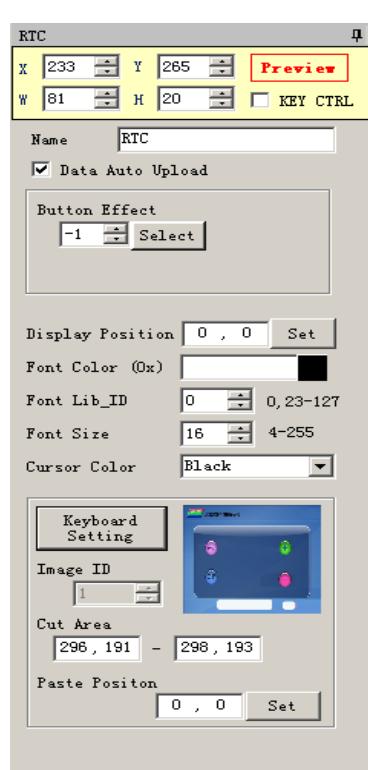
This function is only for making touching area for slider. To display it, please use <Slider display> function.

Adjusted data can be displayed by <Data variable>, <Variable icon> etc.

Illustration of button <Slider Adjustment>:



Hold the button over 0.5 second and slide the slider to modify number in the right, the value will also be changed.



3.1.5 RTC

Selected Area: selected button area.

Preview: preview button effect.

Name: name this button for viewing it in .xls file.

Data Auto Upload: after pressing the button, key code auto sent to serial port.

Button Effect: set picture ID for touching effect, -1: null.

Display Position: data position when typing.

Font Color: data color when typing.

Font Lib_ID: address of ASCII font file.

Font Size: horizontal pixel numbers.

Cursor Color: white/black cursor.

Keyboard setting:

Set the keyboard picture ID and the keyboard area.

Image ID: image ID of keyboard area.

Cut Area: cut area in image ID.

Paste Position: position of the keyboard on current screen.

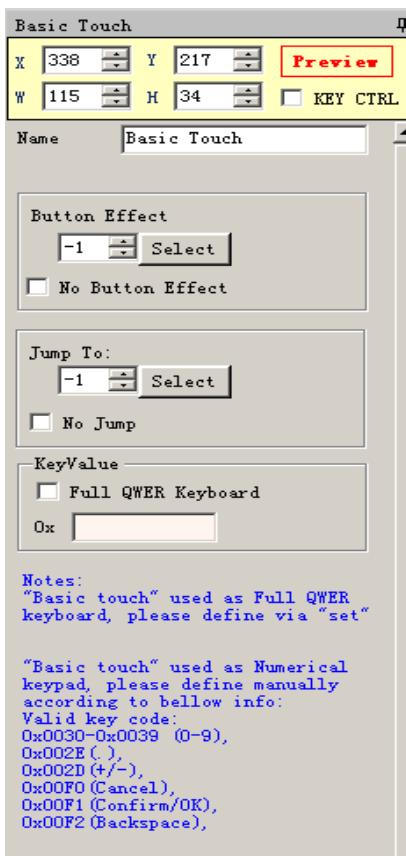
Notes: A keyboard setting is the same as <Data Input>.

Use <RTC display> or <Analog clock display> to display current time.

Illustration of button <RTC>:



Click <RTC> button - Keyboard Pops Up - Clock Sets Up the Current Time.



3.1.6 Touch Control

Selected Area: selected button area.

Preview: preview button effect.

Name: name this button for viewing it in .xls file.

Button Effect: set picture ID for touching effect, -1: null.

Jump To: switch to a new picture after pressing.

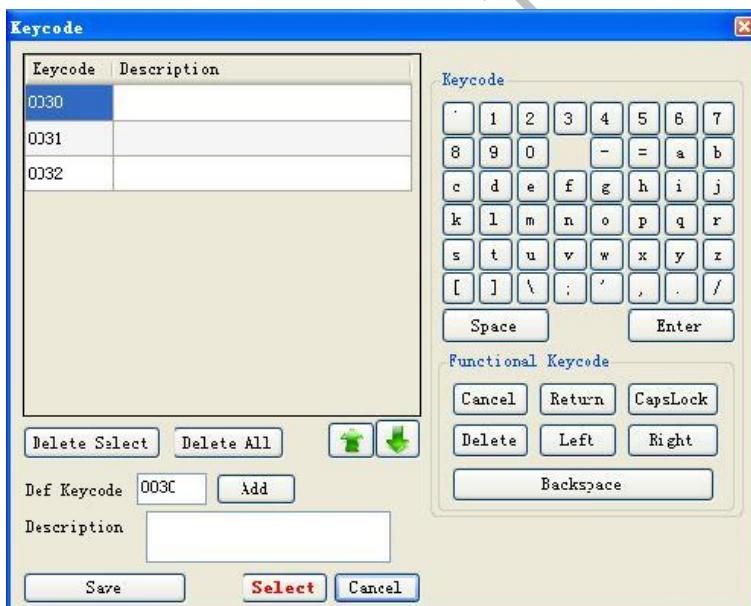
KeyValue:

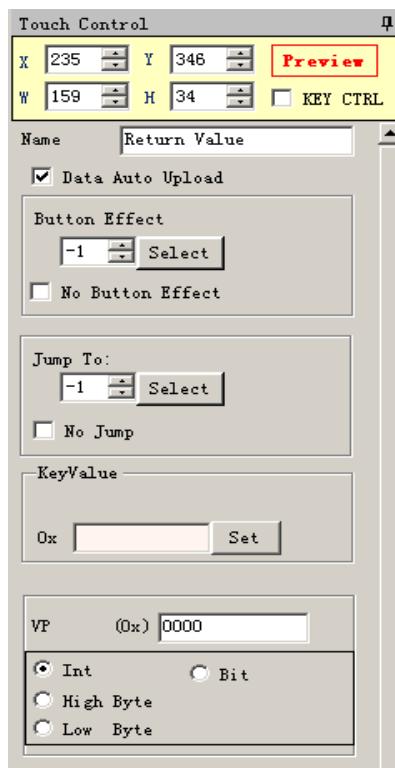
Only <Touch Control> button works on keyboard area.

Valid key code range: 0x0030 - 0x0039 (0-9), 0x002E (.),

0x002D (+/-), 0x00F0 (Cancel), 0x00F1 (Confirm),

0x00F2 (Backspace).





3.1.7 Return Key Code

Selected Area: selected button area.

Preview: preview button effect.

Name: name this button for viewing it in .xls file.

Data Auto Upload: after pressing the button, key code auto sent to serial port.

Button Effect: set picture ID for touching effect, -1: null.

Jump To: switch to a new picture after pressing.

KeyValue: self-defined keyValue for buttons.

VP: variable pointer.

VP Type:

Save in VP address.

Save in high byte of VP address.

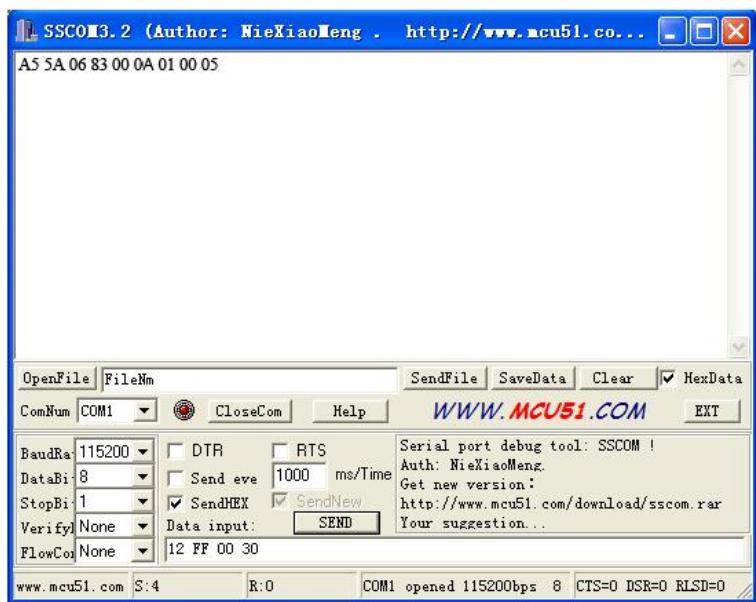
Save in low byte of VP address.

Save in specified bit of VP address.

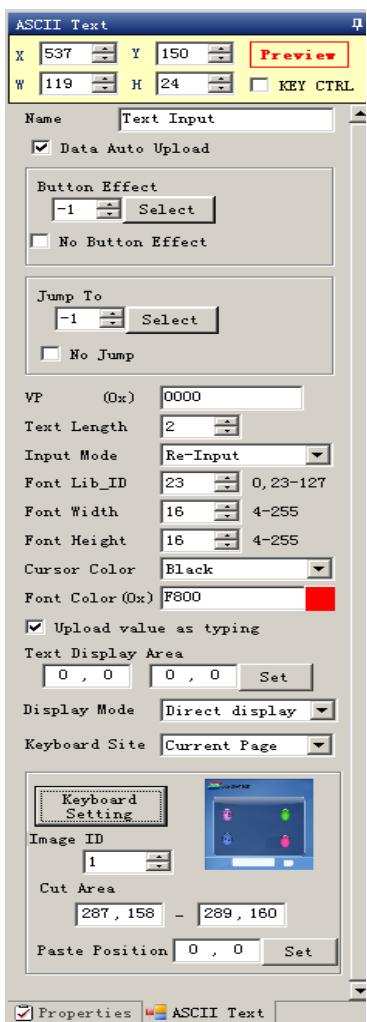
Illustration of button <Return Key Code>:



Set a <Return Key Code> button, of which VP is 0x000A, key value is 0x0005.



DGUS module auto uploads data 0005 to serial port as shown.



3.1.8 ASCII Input

Selected Area: selected button area.

Preview: preview button effect.

Name: name this button for viewing it in .xls file.

Data Auto Upload: after pressing the button, key code auto sent to serial port.

Button Effect: set picture ID for touching effect, -1: null.

Jump To: switch to a new picture after pressing.

VP: variable pointer.

Text Length: length of text, by word, range from 1 to 123.

Input Mode: re-input/ edit text.

Font Lib_ID: address of ASCII font file.

Font Width: horizontal pixel numbers.

Font Height: vertical pixel numbers.

Cursor Color: white/black.

Font Color: data color when typing.

Upload value as typing: tying status upload.

Text Display Area: data position on screen when typing.

Keyboard Displayed in: Current Page/Other Page.

Keyboard Setting:

Set the keyboard picture ID and the keyboard area.

Image ID: image ID of the keyboard area.

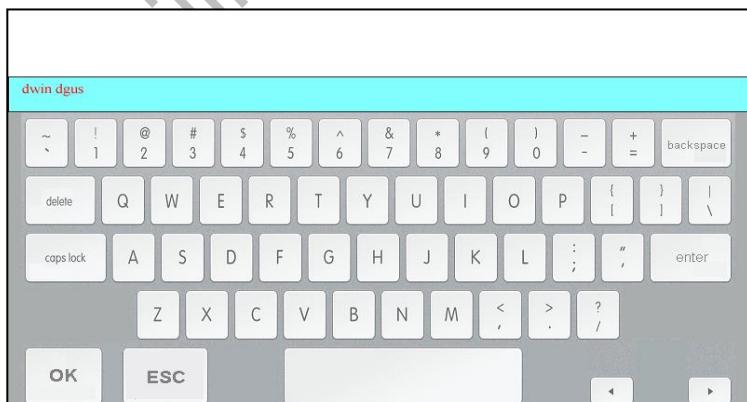
Cut Area: cut area in image ID.

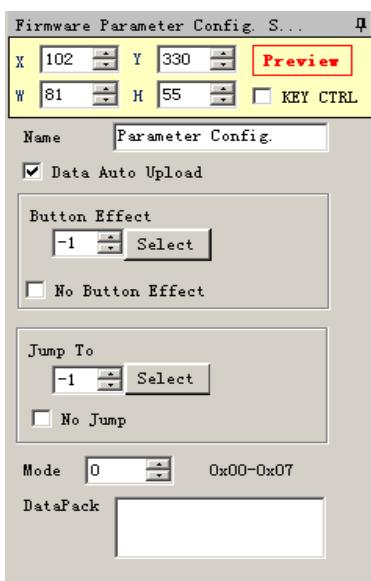
Paste Position: position of the keyboard on current screen.

Note: Create <Touch control> buttons on keyboard to define the key code of the button (0x4161 indicates "A").

Inputted data can be displayed with <Text display> function.

Illustration of button <ASCII Input>:





3.1.9 Firmware Parameter Settings

Selected Area: selected button area.

Preview: preview button effect.

Name: name this button for viewing it in .xls file.

Data Auto Upload: after pressing the button, key code auto sent to serial port.

Button Effect: set picture ID for touching effect, -1: null.

Jump To: switch to a new picture after pressing.

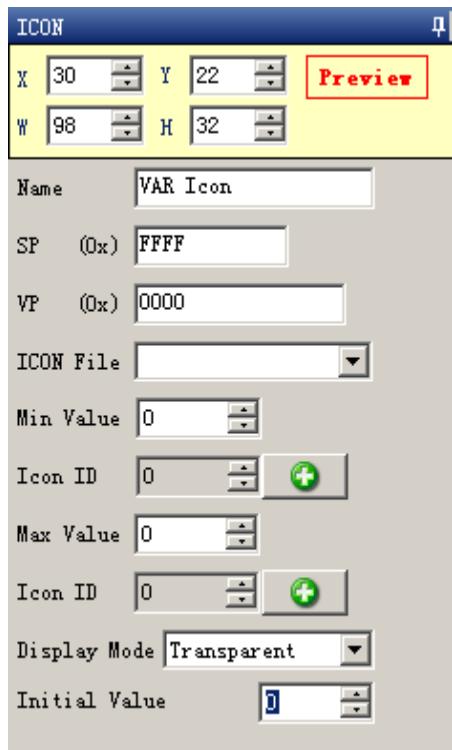
Mode: setup mode.

DataPack: data pack of setup.

Setup Mode

| Mode | Data Pack | Description | Function | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------------|--|--|------|-----|--------|-------|-----|-------|-------|-----|-------|------|-------|------|--|--------|-------|-----|-----|--|--|--|--|--|--|-----|------|------|------|------|--|-------|-------|-----|--------|--|--|--|--|--|--|-----|-----|--|--|--|--|--|--|------|-------|--|--|--|--|--|--|
| 0x00 | No | No | Transmit data from register to variable SRAM in 0x6F00 to 0x6FFF (low bytes). | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0x01 | No | No | Transmit data from address 0x6F00 to 0x6FFF in variable SRAM (low bytes) to register and reset module parameters including R1-R3, R5-RA. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0x02 | Tran_Area | Coordinates of top-left and bottom-right of area. | Convert designated area to monochrome bitmap (vertical mode) and save the data to designated VP address. A. Width (Xe-Xs+1) should be even. B. Height (Ye-Ys+1) should be multiple of 8. C. VP data format shown as below: VP: status indicator, refreshed to 0x5555 after operation. VP+1: horizontal length, by word. (Xe-Xs+1) &0xFFFFE/2 VP+2: numbers of data segment. (Ye-Ys+1) &0xFFFF8/8 VP+3: bitmap data, with MSB priority. If the key code automatically upload is enabled (R2.3=1), module will upload message (value in VP address upload to 0x5555) to serial port. The command is mainly for printing of current screen. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | *VP | VP address for restoring bitmap data. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | <table border="1"> <tr> <td></td><td>X=0</td><td>X=1</td><td>X=2</td><td>X=3</td><td>...</td><td>X=126</td><td>X=127</td></tr> <tr> <td>Y=0</td><td>D0.15</td><td>D0.7</td><td>D1.15</td><td>D1.7</td><td></td><td>D63.15</td><td>D63.7</td></tr> <tr> <td>...</td><td>...</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>Y=7</td><td>D0.8</td><td>D0.0</td><td>D1.8</td><td>D1.0</td><td></td><td>D63.8</td><td>D63.0</td></tr> <tr> <td>Y=8</td><td>D64.15</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>...</td><td>...</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>Y=15</td><td>D64.8</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table> | | X=0 | X=1 | X=2 | X=3 | ... | X=126 | X=127 | Y=0 | D0.15 | D0.7 | D1.15 | D1.7 | | D63.15 | D63.7 | ... | ... | | | | | | | Y=7 | D0.8 | D0.0 | D1.8 | D1.0 | | D63.8 | D63.0 | Y=8 | D64.15 | | | | | | | ... | ... | | | | | | | Y=15 | D64.8 | | | | | | |
| | X=0 | X=1 | X=2 | X=3 | ... | X=126 | X=127 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Y=0 | D0.15 | D0.7 | D1.15 | D1.7 | | D63.15 | D63.7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ... | ... | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Y=7 | D0.8 | D0.0 | D1.8 | D1.0 | | D63.8 | D63.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Y=8 | D64.15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ... | ... | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Y=15 | D64.8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0x03 | *VP | Variable pointer. | Upload data in designated VP address to serial port. Range of Tx_LEN: 0x0001-0xFFFF. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0x04 | Tx_LEN | Length of data to be sent. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0x05 | Tran_Area | Coordinates of top-left and bottom-right of area. | Convert designated area to monochrome bitmap (horizontal mode) and save the data to designated VP address. A. Width (Xe-Xs+1) should be multiple of 16. B. VP data format as shown below: VP: status indicator, refreshed to 0x5555 after operation. VP+1: horizontal length, by word. (Xe-Xs+1) &0xFFFF0/16 VP+2: numbers of data segment. (Ye-Ys+1) VP+3: bitmap data, with MSB priority. If the key code automatically upload is enabled (R2.3=1), module will upload message (value in VP address upload to 0x5555) to serial port. The command is mainly for printing of current screen. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | *VP | VP address for restoring bitmap data. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0x06 | Frame_Head | Frame header (2byte) | Send the current touched position to COM2 (serial port for reserving the system), the format is: Frame_Head + X + Y + Check (The cumulative Sum for 1 byte of X, Y + Frame_end). | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Frame_End | Frame end (2byte) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

3.2 Variable Config.



3.2.1 Variable Icon

Selected Area: (X, Y) are the top-left coordinates of icons.

Preview: preview VAR display effect.

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

Set SP to load description data into variable SRAM.

0xFFFF: load description data from configuration file.

VP: variable pointer.

ICON File: address of icon file.

Min/Max value: limits of variables, null if over limit.

Icon ID:

Icon address in icon file corresponding to the min/max value.

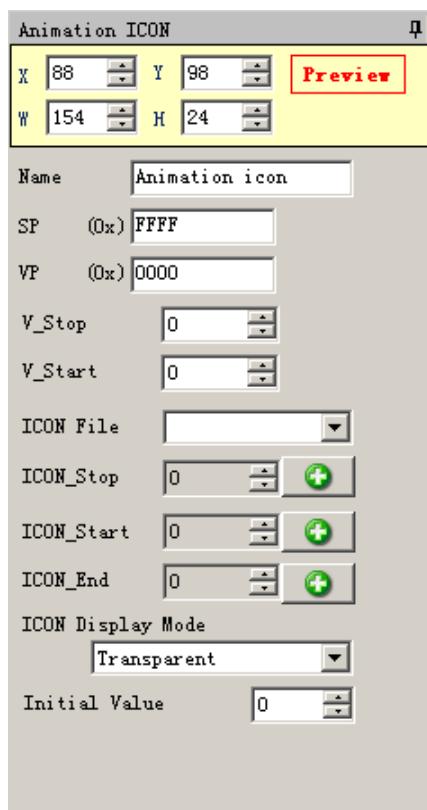
Display Mode: transparent/background.

Initial Value: Set the initial value & save it in the 22 config file, the system will be initiated according to 22 config file when the DGUS is started.

Illustration of variable <Variable Icon>:



Change the value in VP address to display different icons.



3.2.2 Animation Icon

Selected Area: (X, Y) are the top-left coordinates of icons.

Preview: preview VAR display effect.

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

VP: variable pointer.

V_Stop: set value to stop animation.

V_Start: set value to start animation.

ICON File: address of icon file.

ICON Stop: icon at V_stop value.

Icon_Start/Icon_End:

Start/end icon for animation at V_start Value.

ICON Display Mode: transparent/background.

Initial Value: Set the initial value & save it in the 22 config file, the system will be initiated according to 22 config file when the DGUS is started.

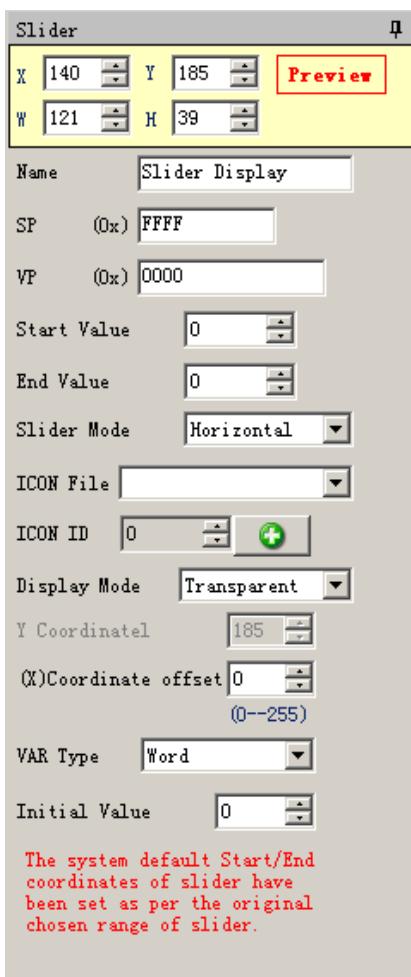
Illustration of variable <Animation Icon>:

When value in VP address is 0, screen display icon 0:



When value in VP address is 9, animation starts.





3.2.3 Slider

Selected Area: (X, Y) are the top-left coordinates of icons.

X, W is start/end point of horizontal slider.

Y, H is start/end point of vertical slider.

Preview: preview VAR display effect.

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

VP: variable pointer.

Start/End Value: value corresponding to start/end point.

Slider Mode: horizontal/vertical.

ICON File: address of icon file.

ICON ID: icon address in icon file.

Display Mode: transparent/background.

Coordinate Offset:

Offset to the left/top.

VAR Type:

Integer (whole VP address).

High byte in VP address.

Low byte in VP address.

Initial Value: Set the initial value & save it in the 22 config file, the system will be initiated according to 22 config file when the DGUS is started.

Note: Set same VP address for <Slider> button and <Slider display> variable to combine them.

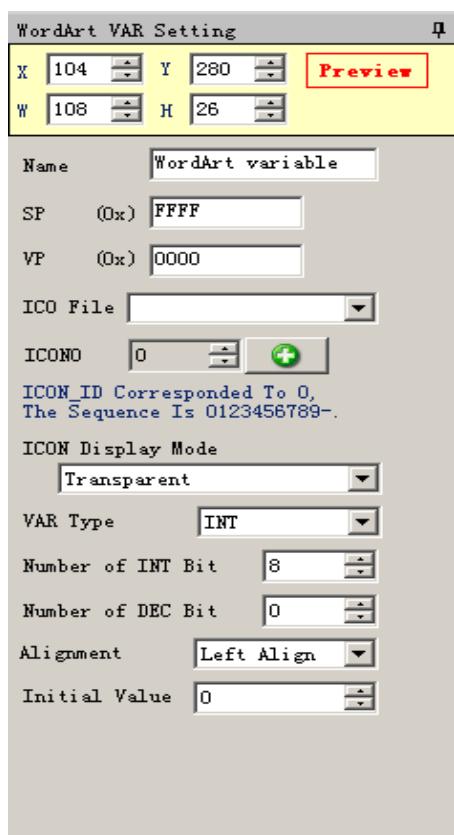
<Slider display> is also used as progress bar.



Send command to serial port:

Frame header, Length, Command, VP, Data string to display the Slider and Data above.

A5 5A 05 82 000C 002C



3.2.4 WordArt

Selected Area: (X, Y) are the top-left coordinates of icons.

Preview: preview VAR display effect.

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

VP: variable pointer.

ICON File: address of icon file.

ICON 0: icon address corresponding to number 0.

ICON Display Mode: transparent/background.

VAR Type: integer/long integer.

Number of INT/DEC bit: length of integer/decimal digits.

Initial Value: Set the initial value & save it in the 22 config file, the system will be initiated according to 22 config file when the DGUS is started.

Illustration of variable <WordArt >:



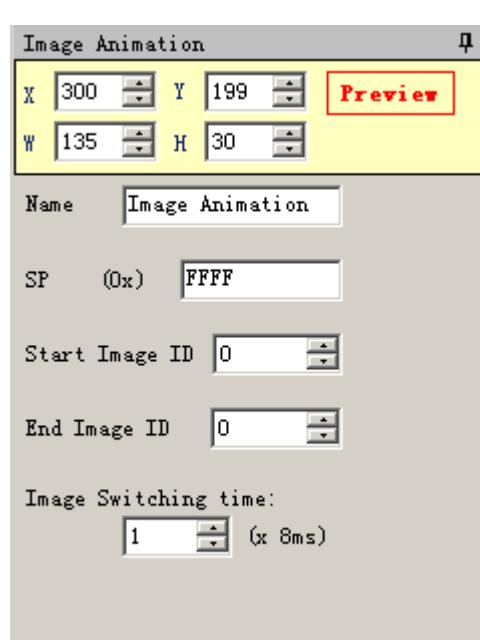
Send command to serial port:

Frame header, Length, Command, VP, Data string to display the WordArt above.

A5 5A 05 82 0CCC 0017

3.2.5 Image Animation

Selected Area: (X, Y) are the top-left coordinates of icons.



Preview: preview VAR display effect.

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

Start Image ID: select starting picture of animation.

End Image ID: select ending picture of animation.

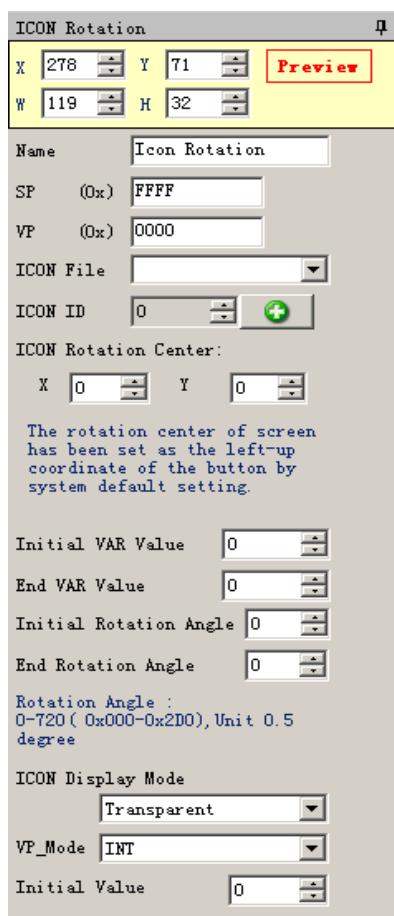
Image Switching Time:

Select switching speed for animation, by every 8ms.

Start image ID should be less than end image ID.

Set a <image animation> on end image to loop.

Send commands or set <touch control> button to interrupt animation.



3.2.6 Icon Rotation

Selected Area: (X, Y) are the coordinates of rotating center.

Preview: preview VAR display effect.

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

VP: variable pointer.

ICON File: address of icon file.

ICON ID: icon address in icon file.

ICON Rotation Center:

X: 0 Y: 0

The rotation center of screen
has been set as the left-up
coordinate of the button by
system default setting.

Initial VAR Value: 0

End VAR Value: 0

Initial Rotation Angle: 0

End Rotation Angle: 0

Rotation Angle :
0~720 (0x000~0x2D0), Unit 0.5
degree

ICON Display Mode

Transparent

VP_Mode: INT

Initial Value: 0

Select rotation center (X, Y) for the icon.

Initial/End VAR Value:

Value corresponding to start/end angle, null if over limit.

Initial/End Rotation Angle:

Select start/end angle, ranging from 0 to 720, by every 0.5°.

Display Mode: transparent/background.

VP_Mode:

Integer (whole VP address).

High byte in VP address.

Low byte in VP address.

Initial Value: Set the initial value & save it in the 22 config file, the system will be initiated according to 22 config file when the DGUS is started.

Send serial commands or press buttons to change value in VP address, and then to adjust the angle of pointer.

Illustration of variable <Icon Rotation>:

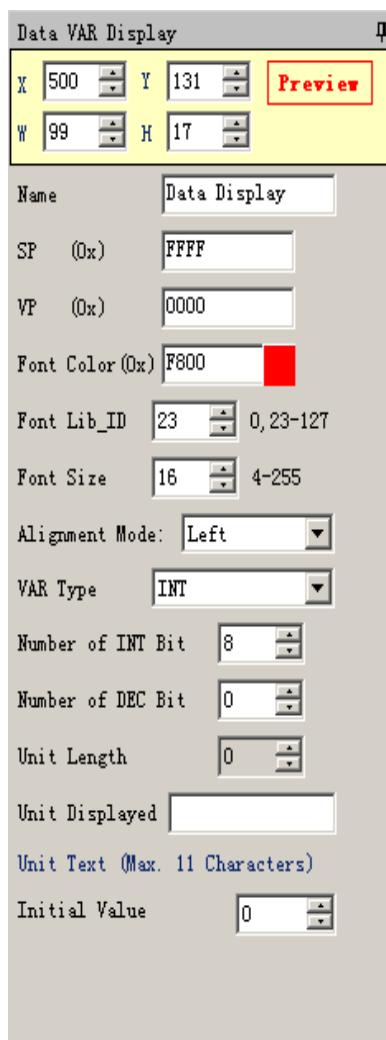
Icons file for rotation:



Send command to serial port:

Frame header, Length, Command, VP, Data string to display the ICON above.

A5 5A 05 82 000A 0084



3.2.7 Data Variable

Selected Area: (X, Y) are the top-left coordinates of data.

Preview: preview VAR display effect.

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

VP: variable pointer.

Font Color: data color.

Font Lib_ID: address of ASCII font file.

Font Size: horizontal pixel numbers.

Alignment Mode: Right/Left /Centered.

VAR Type:

0x00: integer.

0x01: long integer.

0x02: high byte in VP address.

0x03: low byte in VP address.

Number of INT Bit: length of integer digits.

Number of DEC Bit: length of decimal digits.

Unit Length:

Corresponding to displayed unit automatically.

Unit Displayed:

ASCII unit for data, max length is 11 bytes.

Initial Value: Set the initial value & save it in the 22 config file, the system will be initiated according to 22 config file when the DGUS is started.

Send commands or set buttons to modify displayed data.

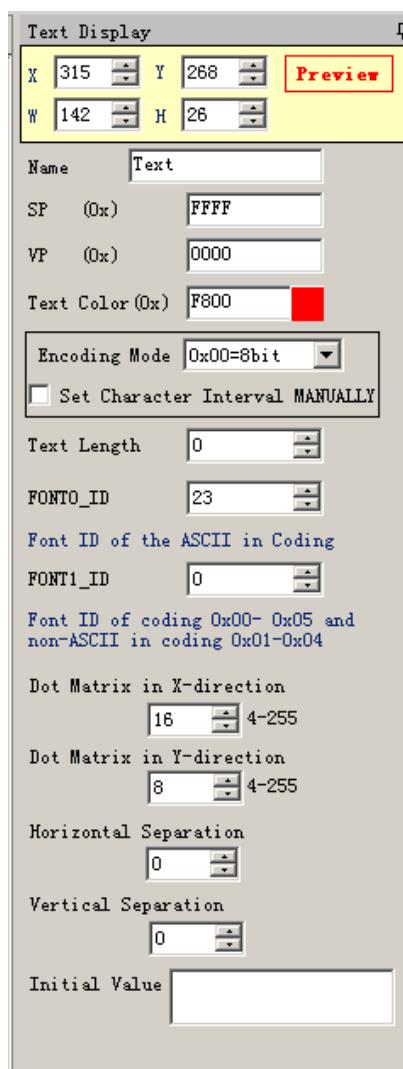
Illustration of variable <Data Variable>:



Send command to serial port:

Frame header, Length, Command, VP, Data string to display the Data (left-up) above.

A5 5A 05 82 0000 0022



3.2.8 Text Display

Selected Area:

(X, Y) are top-left coordinates of data.

Textbox is the selected area.

Preview: preview VAR display effect.

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

VP: variable pointer.

Text Color: data color.

Encoding Mode:

0x00: 8bit encoding, 0x01: GB2312, 0x02: GBK, 0x03:BIG5,

0x05: UNICODE.

Set Character Interval MANUALLY: on/off.

Text Length: select text length, by byte.

Font0_ID: address of ASCII font file.

Font1_ID: address of non-ASCII font file.

Dot Matrix in X/Y-direction: select font size. Please note that parameter should be the same with the size of font file.

Horizontal/Vertical Separation:

Pixel distance in Horizontal/Vertical.

Initial Value: Set the initial value & save it in the 22 config file, the system will be initiated according to 22 config file when the DGUS is started.

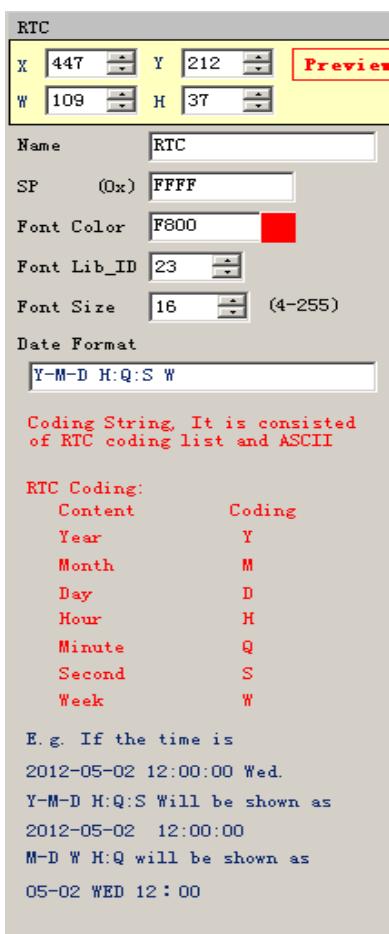
Illustration of variable <Text Display>:



Send command to serial port:

Frame header, Length, Command, VP, Data string to display the Text (bottom-left) above.

| | | | | | | | | | | | | | | |
|----|----|----|----|------|----|----|----|----|----|----|----|----|----|----|
| A5 | 5A | 0D | 82 | 0008 | 64 | 77 | 69 | 6E | 20 | 64 | 67 | 75 | 73 | 76 |
|----|----|----|----|------|----|----|----|----|----|----|----|----|----|----|



3.2.9 Digital RTC Display

Selected Area: (X, Y) are the top-left coordinates of data.

Preview: preview VAR display effect.

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

Font Color: data color.

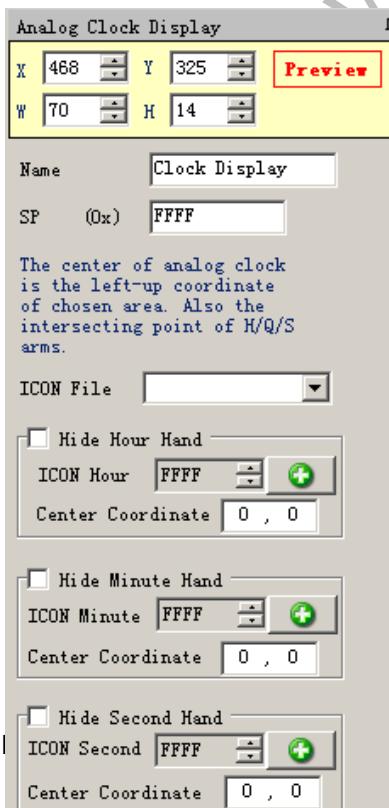
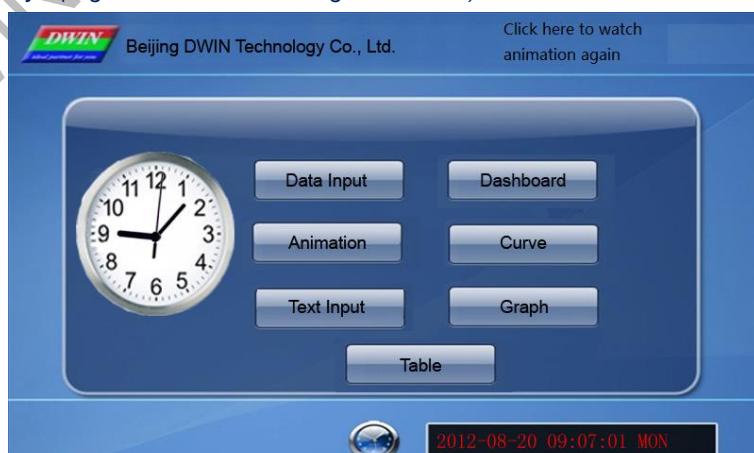
Font Lib_ID: address of ASCII font file.

Font Size: horizontal pixel numbers.

Date Format: refer to the red texts in picture in the left.

Use <RTC> button to modify current time.

Illustration of variable <Digital RTC Display> (Digital clock on bottom-right of screen):



3.2.10 Analog Clock Display

Selected Area: (X, Y) are the rotating center coordinates.

Preview: preview VAR display effect.

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

ICON File: address of icon file.

Analog Clock:

ICON Hour: select hour hand ID in icon file.

Center Coordinate: rotation center in icon.

Minute Hand:

ICON Minute: select minute hand ID in icon file.

Center Coordinate: rotation center in icon.

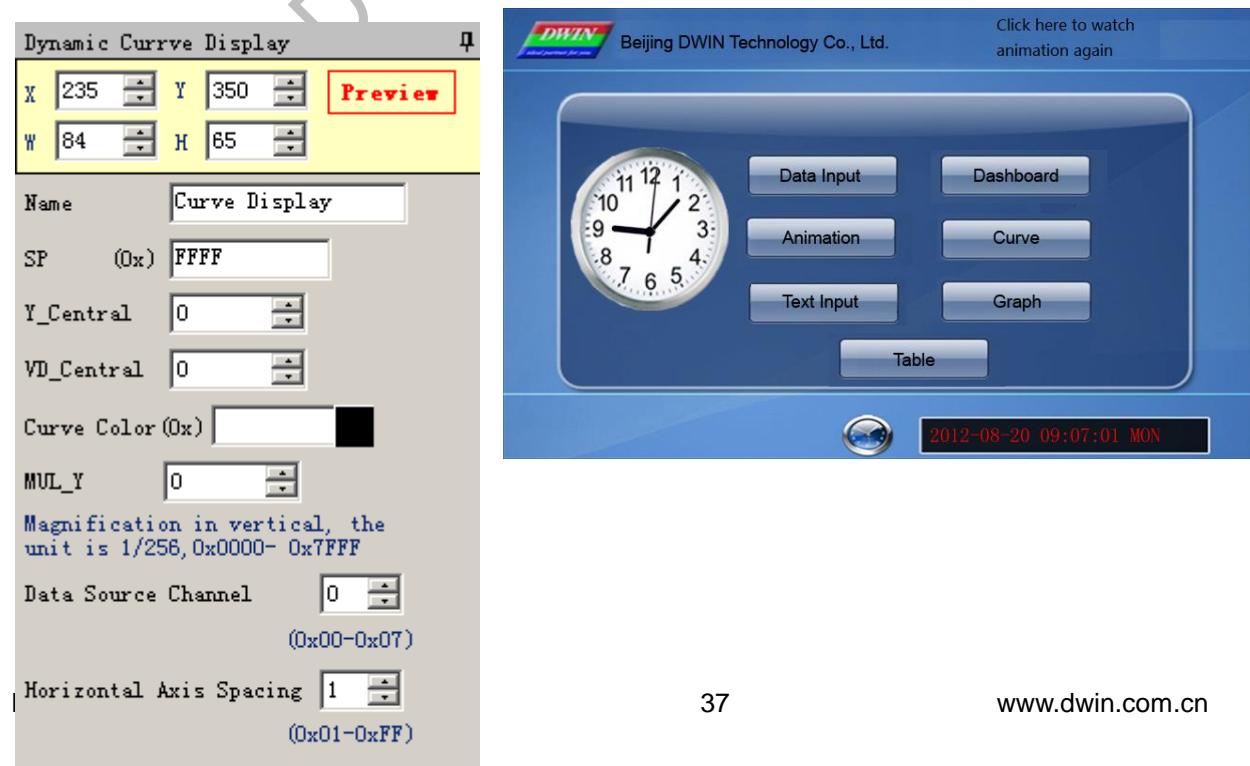
Second Hand:

ICON Second: select second hand ID in icon file.

Center Coordinate: rotation center in icon.

Use <RTC> button to modify current time.

Illustration of variable <Analog Clock Display>:



3.2.11 Dynamic Trend Curve

Selected Area: select window area, null if over range.

Preview: preview VAR display effect.

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

Y_Central: select center line of trend curve.

VD_Central:

Trend curve value at center line, normally average of Max & Min value.

Curve Color: select color for trend curve.

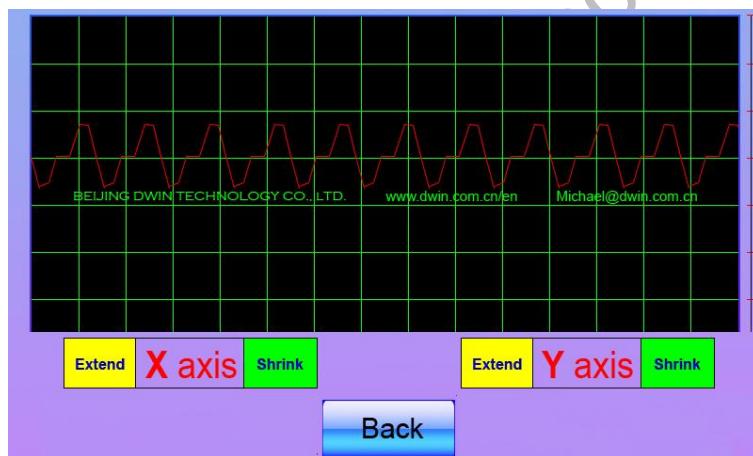
MUL_Y: magnification in Y direction, by every 1/256.

Data Source Channel: select channel for trend curve.

Horizontal Spacing:

Transverse spacing between sampling points.

Illustration of variable <Dynamic Trend Curve Display>

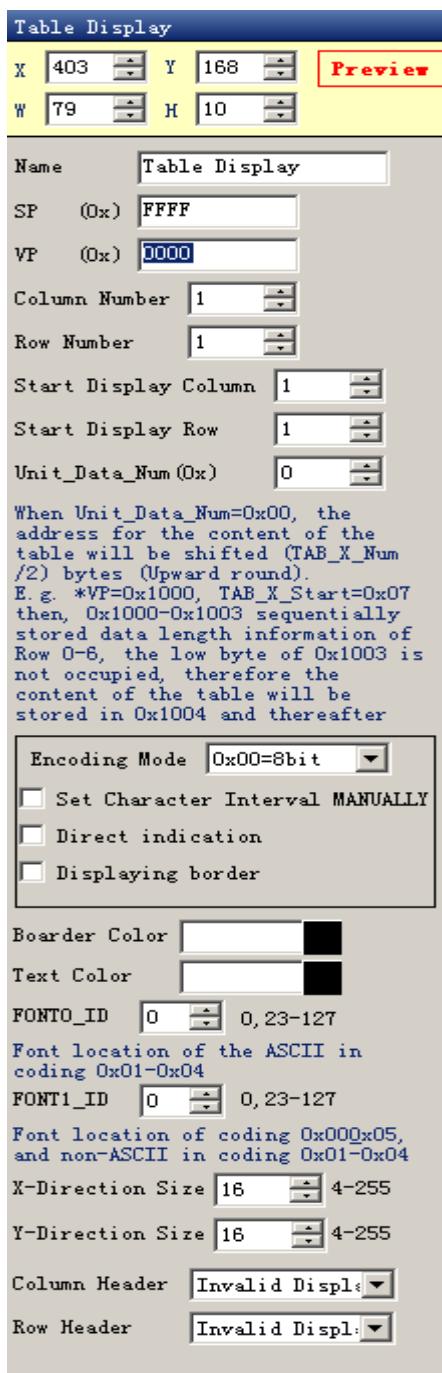


Send command to serial port:

Frame header, Length, Command, Data channel, Data string to display the trend curve above.

| | | | | |
|-------|----|----|----|------------------------------------|
| A5 5A | 18 | 84 | 01 | 0800 0700 0710 0733 0800 0800 0800 |
| | | | | 0800 0900 0908 0906 |

3.2.12 Table Display



Selected Area: select table area, null if over range.

Preview: preview VAR display effect.

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

VP: variable pointer, starting address of the data in table.

Column/Row Number: set the size of table.

Start Display Column/Row:

Select starting column/row to be displayed.

Unit_Data_Num:

0x01-0x7F: length of data for one cell.

0x00: data in VP address defines the length of each column.

When Unit_Data_Num is 0x00, starting address of data will be (Row number/2, round up to integer) backward from VP address.

Encoding Mode:

0x00: 8bit, 0x01: GB2312, 02: GBK, 03: BIG5, 04: SJIS, 05: UNICODE.

Set Character Interval MANUALLY: on/off.

Boarder Color: select table boarder color.

Text Color: select text color.

FONT0_ID: address of ASCII font file.

FONT1_ID: address of none-ASCII font file.

X/Y-Direction Size:

Select font size, accordant with width of fonts in font file.

Column Header: Valid Display/Invalid Display.

Row Header: Valid Display/Invalid Display.

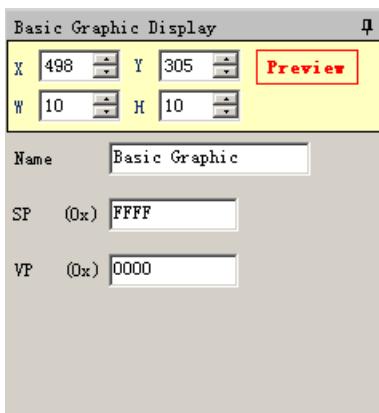
Data for table can be loaded by 22.bin file. Refer to DGUS document for detailed instruction.

Illustration of variable <Table Display>:



If the length of data is shorter than designated, please use 0xFFFF as end mark of data in this cell.

For oversized table, users can use slider to pull the table.



3.2.13 Basic Graphic Display

Selected Area: select window area, null if over range.
(Limit is only effective for 0x0001 - 0x0005 commands).

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

VP: variable pointer.

String Format

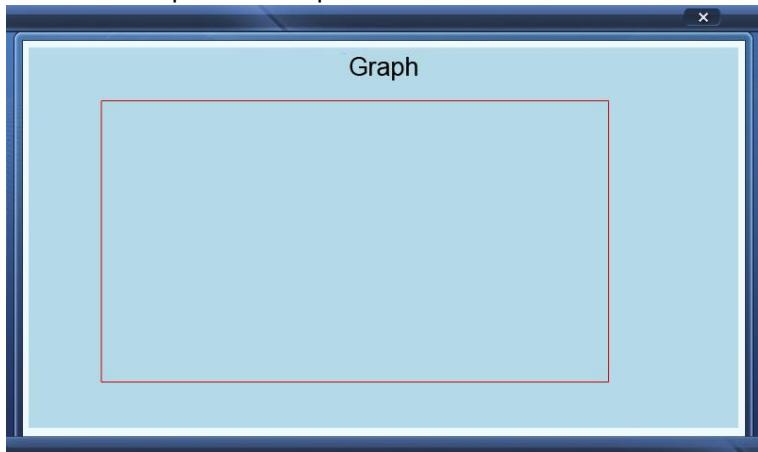
| Address | Definition | Description |
|---------|-------------------|------------------|
| VP | CMD | Command |
| VP+1 | Data_Pack_Num_Max | Data Pack Number |
| VP+2 | DATA_Pack | |

Data Pack for Basic Graphic

| CMD | Function | Description of Data Pack Format, by word | | | |
|--------|---------------------|--|--------|------------|---|
| | | Relative Address | Length | Definition | Description |
| 0x0001 | Dot | 0x00 | 2 | (x, y) | Dot coordinates. |
| | | 0x02 | 1 | Color | Dot color. |
| 0x0002 | Line | 0x00 | 1 | Color | Line color. |
| | | 0x01 | 2 | (x, y)0 | Vertex 0 coordinates. |
| | | 0x03 | 2 | (x, y)1 | Vertex 1 coordinates. |
| | | 0x01+2*n | 2 | (x, y)n | Vertex n coordinates. |
| 0x0003 | Rectangle | 0x00 | 2 | (x, y)s | Top-left coordinates. |
| | | 0x02 | 2 | (x, y)e | Bottom-right coordinates. |
| | | 0x04 | 1 | Color | Rectangle's color. |
| 0x0004 | Rectangle Area Fill | 0x00 | 2 | (x, y)s | Top-left coordinates. |
| | | 0x02 | 2 | (x, y)e | Bottom-right coordinates. |
| | | 0x04 | 1 | Color | Filled color. |
| 0x0005 | Circle | 0x00 | 2 | (x, y) | Circle center coordinates. |
| | | 0x02 | 1 | Rad | Radius of circle. |
| | | 0x03 | 1 | Color | Circle color. |
| 0x0006 | Picture cut/paste | 0x00 | 1 | Pic_ID | Image ID of cutting area. |
| | | 0x01 | 2 | (x, y)s | Top-left coordinates of the cutting area. |
| | | 0x03 | 2 | (x, y)e | Bottom-right coordinates of the cutting area. |
| | | 0x05 | 2 | (x, y) | Paste position on current screen. |
| 0x**07 | Icon Display | 0x00 | 2 | (x, y) | Top-left coordinates of icon. |
| | | 0x02 | 1 | ICON_ID | Icon ID in icon file, high byte of command specifies address of icon file, display mode is transparent. |
| 0x0008 | Area fill | 0x00 | 2 | (x, y) | Sampling dot coordinates. |
| | | 0x02 | 1 | COLOR | Filled color. |
| 0x0009 | Vertical line | 0x00 | 1 | Color0 | Connect (X0, Y0s) (X0, Y0e) with color 0 |
| | | 0x01 | 1 | X0 | |
| | | 0x02 | 1 | Y0s | |
| | | 0x03 | 1 | Y0e | |

Judging condition:

0xFF: finish operation,
0xFE: skip to next step.

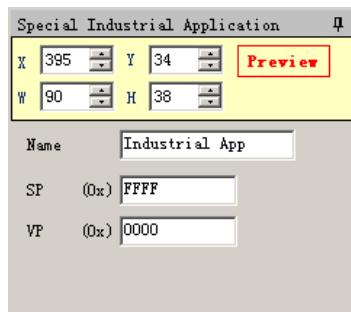


Send command to serial port:

Frame header, Length, Command, Address, Controlling bytes, Data pack, Coordinate, Color

A5 5A 11 82 20 00 00 03 00 01 00 64 00 64 02 8C 01 90 F8 00

To get the rectangle above.



3.2.14 Special Industrial Application

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

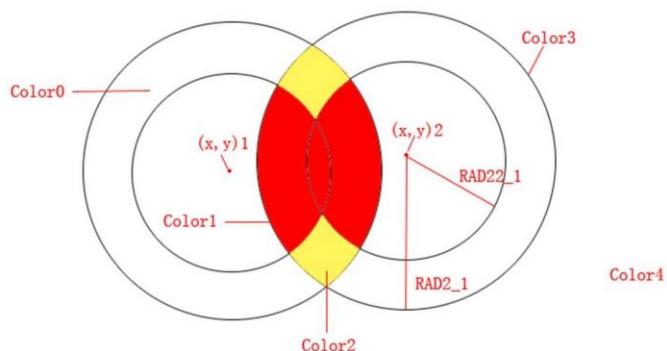
VP: variable pointer.

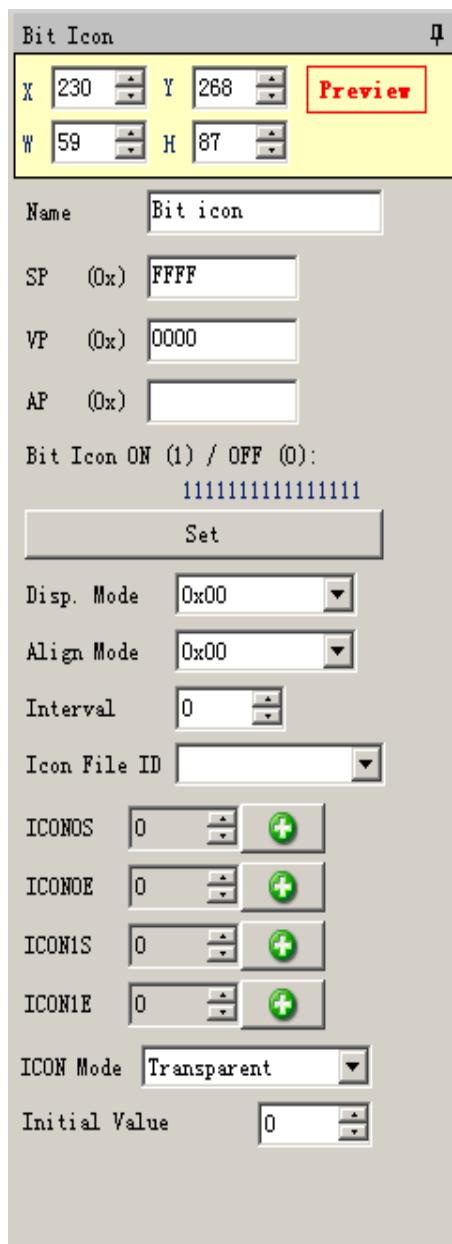
String Format

| Address | Definition | Description |
|---------|-------------------|------------------|
| VP | CMD | Command |
| VP+1 | Data_Pack_Num_Max | Data Pack Number |
| VP+2 | DATA_Pack | |

Data pack for Special Industrial Application

| CMD | Function | Description of data pack format, by word | | | |
|--------|--|--|--------|------------|--|
| | | Relative Address | Length | Definition | Description |
| 0x0001 | Overlapped Area of Multiple Circles Fill | 0x00 | 1 | Color0 | Color of "Safe Zone". |
| | | 0x01 | 1 | Color1 | Color of normally overlapped area (Overlapped once). |
| | | 0x02 | 1 | Color2 | Color of High-Risk overlapped area (Overlapped twice or more). |
| | | 0x03 | 1 | Color3 | Color of circles. |
| | | 0x04 | 1 | Color4 | Color of evasion. |
| | | 0x05 | 4 | Disp_Area | Display area, null if over range. |
| | | 0x09+4*n | 2 | (x, y)n | Center coordinates of No. n. |
| | | 0x0B+4*n | 1 | RADn_1 | The bigger radius of No. n concentric circles. |
| | | 0x0C+4*n | 1 | RAD2n_2 | The smaller radius of No. n concentric circles. |





3.2.15 Bit Variable Icon

Selected Area: (X, Y) are coordinates of top-left of icons.

Preview: preview VAR display effect.

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

VP: variable pointer.

AP: substitutive variable pointer, reserved 2 words.

Bit Icon ON (1) / OFF (0): define BITS to display.

Disp. Mode: shown as the following table.

Align Mode:

0x00: X++, space unreserved for undesignated bits.

0x01: Y++, space unreserved for undesignated bits.

0x02: X++, space reserved for undesignated bits.

0x03: Y++, space reserved for undesignated bits.

Interval: spacing between icons.

Icon File ID: address of icon file.

ICON0S:

Icon ID for bit0 in non-animation mode, or starting
Icon ID for bit0 in animation mode.

ICON0E: ending icon ID for bit0 in animation mode.

ICON1S:

Icon ID for bit1 in non-animation mode, or starting
Icon ID for bit1 in animation mode.

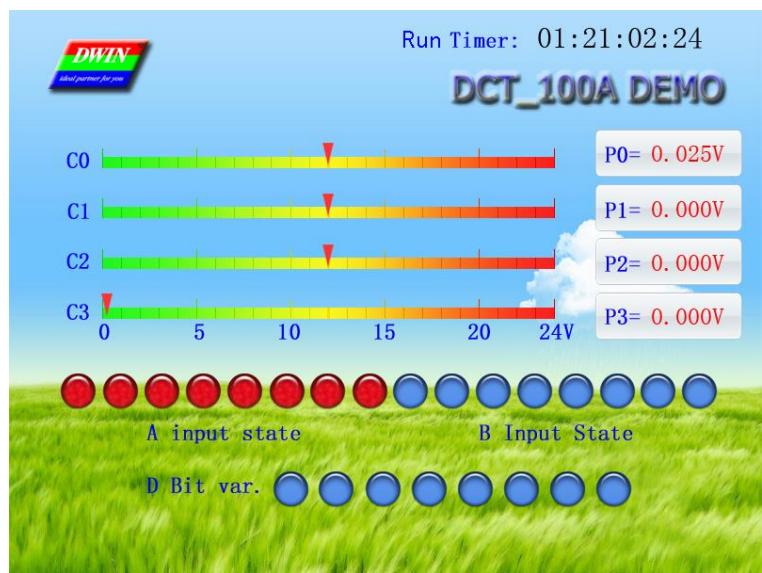
ICON1E: ending icon ID for bit1 in animation mode.

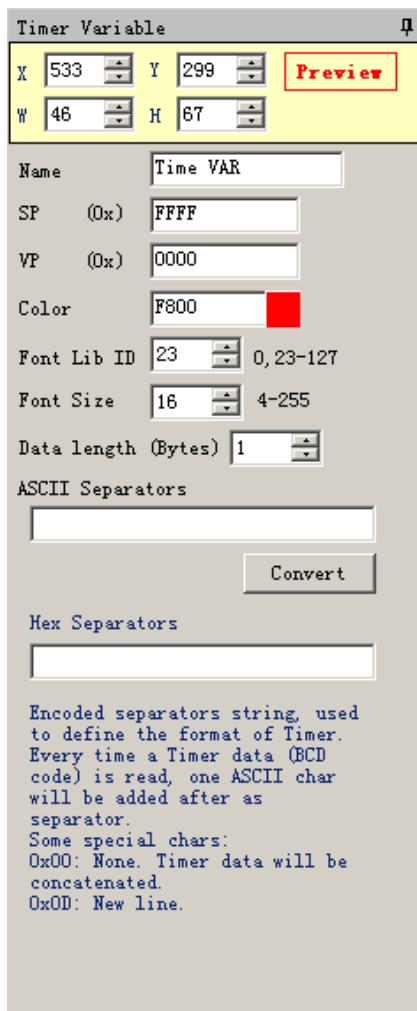
ICON Mode: Transparent/Opaque.

Initial Value: Set the initial value & save it in the 22 config
file, the system will be initiated according to 22 config file
when the DGUS is started.

| Display_Mode | Value of bit | |
|--------------|-----------------------------|-----------------------------|
| | 0 | 1 |
| 0x00 | ICON0S | ICON1S |
| 0x01 | ICON0S | Null. |
| 0x02 | ICON0S | Animation: ICON1S - ICON1E. |
| 0x03 | Null. | ICON1S |
| 0x04 | Null. | Animation: ICON1S - ICON1E. |
| 0x05 | Animation: ICON0S - ICON0E. | ICON1S |
| 0x06 | Animation: ICON0S - ICON0E. | Null. |
| 0x07 | Animation: ICON0S - ICON0E. | Animation: ICON1S - ICON1E. |

Illustration of variable <Bit Icon> (on bottom of screen):





3.2.16 Timer Variable

Selected Area: (X, Y) are the top-left coordinates of data.

Preview: preview VAR display effect.

Name: name this button for viewing it in .xls file.

SP: stack pointer, default setting is 0xFFFF.

VP: variable pointer.

Color: data color.

Font Lib ID: address of font file, 8bit encoding half-width.

Font Size: font size in X-direction.

Data length (Bytes): byte numbers to be displayed.

ASCII Separators: data string.

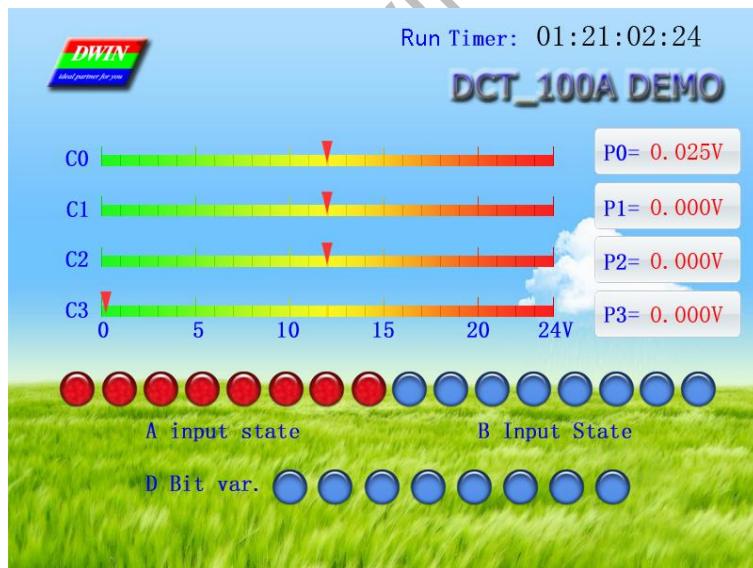
Convert: convert ASCII Separators into Hex Separators.

Encoded separators string, used to define the format of Timer.

Every time a Timer data (BCD code) is read, one ASCII char will be added after as separator.

Some special chars: 0x00: none, Timer data will be concatenated; 0x0D: new line.

Illustration of variable <Bit Icon> (on top-right of screen):



4 Commands

4.1 Data Frame

Serial data frame is constituted with 5 parts as shown in chart below:

| Data Block | 1 | 2 | 3 | 4 | 5 |
|-------------|--|--|--------------|-------------|---------------------------------------|
| Definition | Frame header | Data length | Command type | Data string | CRC checksum |
| Data Length | 2 | 1 | 1 | N | 2 |
| Description | Defined by R3 and RA parameter in config.txt | Including command type, data string and CRC checksum | 0x80-0x84 | | Enabled by R2 parameter in config.txt |

4.2 Command Set

| Function | CMD | Data | Description |
|----------------------|------|---|--|
| Access Register | 0x80 | ADR(0x00-0xFF)+Data_Pack | Write data in particular address of register |
| | 0x81 | ADR(0x00-0xFF)+RD_LEN(0x00-0xFF) | Read data in particular address of register |
| | | ADR(0x00-0xFF)+RD_LEN+Data_Pack | Response of DWIN LCD module |
| Access Variable SRAM | 0x82 | ADR_H:(0x0000-0x6FFF)+DATA0...+DATAAn | Write data in particular address of variable SRAM |
| | 0x83 | ADR_H: L(0x0000-0x6FFF)+RD_LEN(0x00-0x7F) | Read data in particular address of variable SRAM |
| | | ADR_H: L+RD_LEN+DATA0.....+DATAAn | Response of DWIN LCD module |
| Trend Curve Buffer | 0x84 | CH_Mode(Byte)+DATA0(Word)+...+DATAAn | <p>Write trend curve buffer.</p> <p>CH_Mode defines the channels of data :</p> <ul style="list-style-type: none"> ➢ Each bit in CH_Mode corresponds to one channel. ➢ CH_Mode. 0 corresponds to channel 0. ➢ Low channel ranges ahead. ➢ E.g.: <ul style="list-style-type: none"> ➢ CH Mode=0x83(10000011B), ➢ data format like "CH7+CH1+CH0" |

Register is accessed by every byte, variable SRAM and trend curve buffer is accessed by every word.

4.3 Register

Register, 256 bytes, is used for hardware operation and process control.

| Register Address | Definition | Length (Byte) | Description |
|------------------|-------------|---------------|---|
| 0x00 | Version | 1 | DGUS version number, BCD code, 0x10 indicates V1.0. |
| 0x01 | LED_NOW | 1 | LED brightness, 0x00-0x40. |
| 0x02 | BZ_TIME | 1 | Buzzer beeping time, by every 10ms. |
| 0x03 | PIC_ID | 2 | Read: read current picture ID. Write: switch to specific picture ID. |
| 0x05 | TP_Flag | 1 | 0x5A: there is update of touching area. Others= no updating. TouchPanel data is no longer updated if user did not clear the flag after data retrieving. |
| 0x06 | TP_Status | 1 | 0x01: first click. 0x03: pressing down. 0x02: uplift pressing. Others: null. |
| 0x07 | TP_Position | 4 | Coordinate of touching position: X_H:L, Y_H:L. |
| 0x0B | TPC_Enable | 1 | 0x00: disable the touchPanel. Others: enable the touchPanel. Default setting: 0xFF. |
| 0x0C-0x0F | Reserve | 4 | Undefined. |
| 0x10-0x1A | R0-RA | 11 | Mapping of SD card config. register, read only. |
| 0x1F | RTC_COM_ADJ | 1 | 0x5A: RTC data is rewritten through serial port, cleared after RTC auto updating. |
| 0x20 | RTC_NOW | 16 | YY:MM:DD:WW:HH:MM:SS |

Send serial command to modify current time, e.g.: A5 5A 0A 80 1F 5A 12 10 25 0412 00 01. "04" means Thursday, it can be written as any day you choose.

| | | | |
|-----------|-------------|----|--|
| 0x30-0x3F | Reserve | 16 | Undefined. |
| 0x40 | En_Lib_OP | 1 | 0x5A: applying writing in font flash memory, clear after operation. |
| 0x41 | Lib_OP_Mode | 1 | 0x50: Transfer data from variable SRAM to font flash memory. 0xA0: Transfer data from font flash memory to variable SRAM. |
| 0x42 | Lib_ID | 1 | Designate font address for data exchange. Total space are 16MB, font space: 0x40-0x7F, maximum space of every font is 128KW. |
| 0x43 | Lib_Address | 3 | Designate address in font library for data exchange. Specified the first (word) address for data operation in font storage, 0x00:00:00-0x01:FF:FF. |
| 0x46 | VP | 2 | Designate variable SRAM addresses for data exchange. Specified the first (word) address for data operation in font storage, 0x00:00-0x6F:FF. |
| 0x48 | OP_Length | 2 | Length of exchanged data, by word. |

Save 1KW variable data string starting from 0x1000 address into #64 font ID with starting 0x0000 address, send serial command: A5 5A 0C 80 40 5A 50 40 00 00 00 10 00 02 00.

| | | | | |
|-----------|----------|-----|---|---------------------------|
| 0x4A | Timer0 | 2 | 16-bit software timer, in term of 4ms, auto-decrement to 0. | Maximum error is +/- 4ms. |
| 0x4C | Timer1 | 1 | 8-bit software timer, in term of 4ms, auto-decrement to 0. | |
| 0x4D | Timer2 | 1 | 8-bit software timer, in term of 4ms, auto-decrement to 0. | |
| 0x4E | Timer3 | 1 | 8-bit software timer, in term of 4ms, auto-decrement to 0. | |
| 0x4F | Key_code | 1 | Address of key code for 13 touch control config. file, 0x00: null. Clear after operation executed. | |
| 0x50-0xFF | Reserve | 182 | Undefined. | |

Register is accessed by command 0x80/0x81.

➤ **Variable SRAM**

Variable SRAM, 28K words, is for storing real-time data. Variable SRAM is divided into 28K address, ranging from 0x0000 to 0x6FFF.

Variable SRAM is read and written by word.

Variable SRAM is accessed by command 0x82/0x83.

➤ **Trend Curve Buffer**

Trend curve buffer is for storing real-time trend curve data, supporting 8 trend curves simultaneously. Trend curve buffer is written by word, each dot of trend curve occupies 2 bytes.

Trend curve buffer is accessed by command 0x84, write only.

Beijing DWIN Technology Co., Ltd.