



Customize FlexMatrix Keyboard Controllers

Associated Part Family: SK5100, SK5101, SK5102, SK5120, SK5122

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1 Overview

Sprintek FlexMatrix keyboard controllers such as SK5100/5101, SK5102, SK5120 and SK5122 provide many features for keyboard manufacturers to configure the ICs for their specific applications. These features are four matrix tables, Fn modes, backlight PWM control, general purpose output (GPO), state control output (SCO), LED drivers, alert LED. In addition, SK5102 support KeyMouse and AB incremental encoder. This article introduces how to use and configure these features.

2 Configuration and Test Software Tools

FlexMatrix Editor and Programmer software are the tools to configure FlexMatrix keyboard controllers. FlexMatrix Tester software is a free tool to test keyboard matrix.

The latest version can be downloaded from the link
<http://www.sprintek.com/support/Downloads.aspx>.

Microsoft .NET framework 3.5 or later but earlier than 4.0 must be installed to run these software tools. Please download .NET framework from Microsoft.com link
<http://msdn.microsoft.com/en-gb/netframework/default.aspx>.

Tool List:

- FlexMatrix Editor for SK5100-5101
- FlexMatrix Editor for SK5102
- FlexMatrix Editor for SK5120
- FlexMatrix Editor for SK5122
- FlexMatrix Programmer
- FlexMatrix Programmer for SK5122
- FlexMatrix Tester

Here are screen snapshots of these FlexMatrix tools.

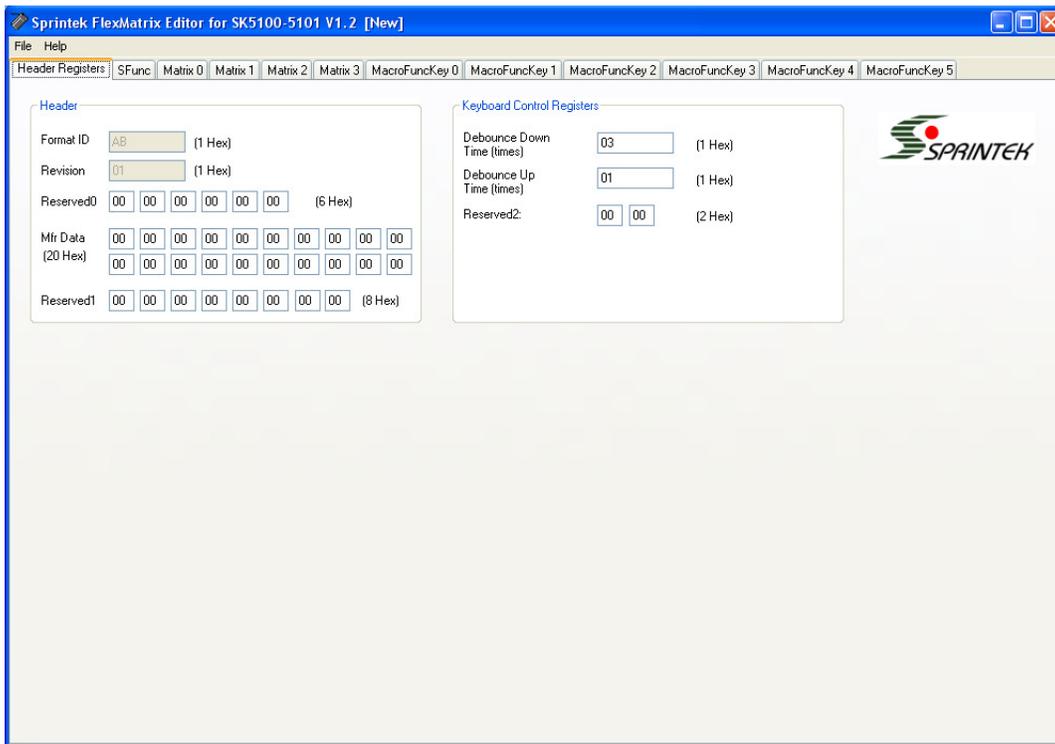


Figure 1 – FlexMatrix Editor for SK5100-5101 Snapshot

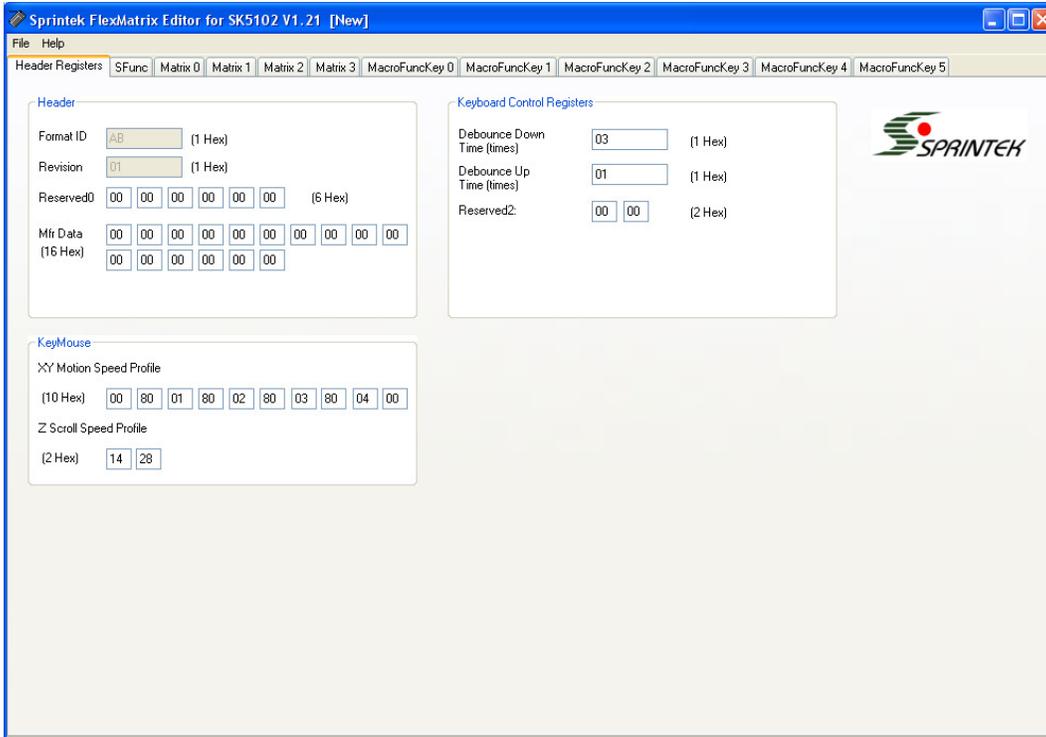


Figure 2 – FlexMatrix Editor for SK5102 Snapshot

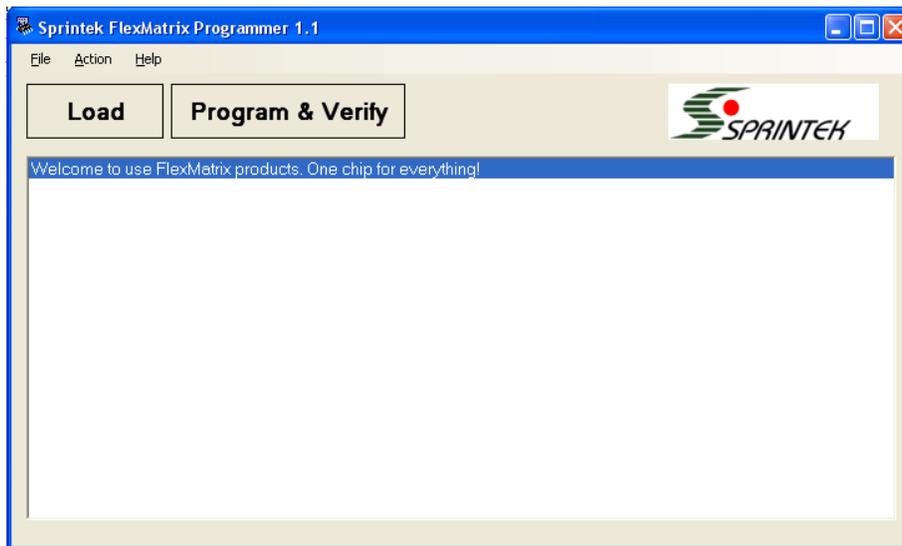


Figure 3 – FlexMatrix Programmer Snapshot

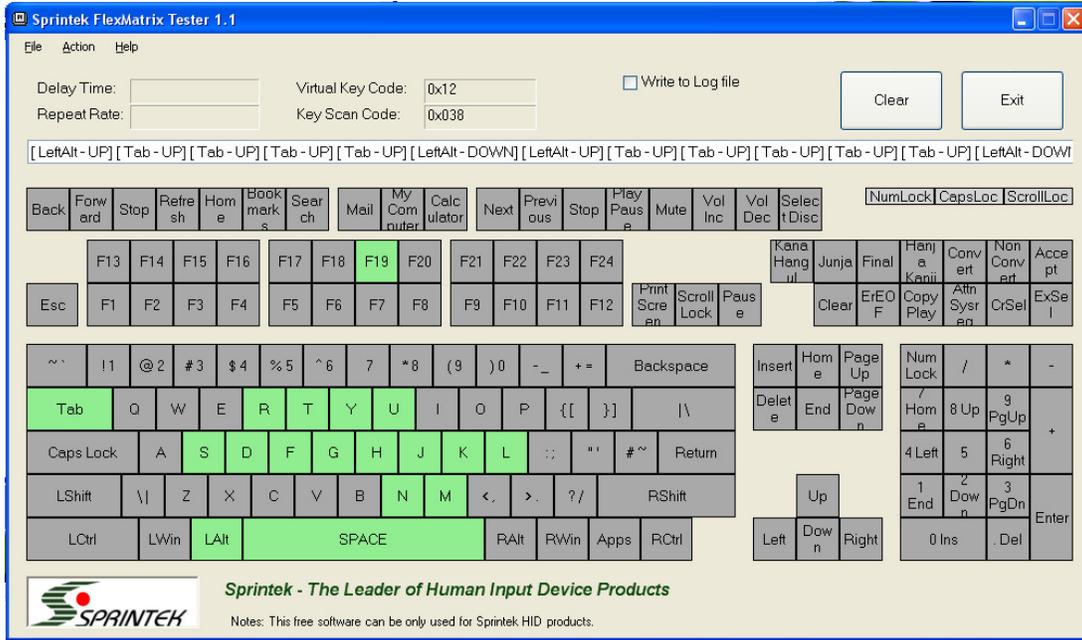


Figure 4 – FlexMatrix Tester Snapshot

3 Customization Workflow

FlexMatrix family keyboard controller ICs provide the ability for users to program keyboard matrix and other control parameters. To support this feature, FlexMatrix Programmer and FlexMatrix Editor software are developed. A user uses FlexMatrix Editor software to edit the keyboard matrix information and other control parameters into a binary file, then uses FlexMatrix Programmer software to download the binary file to the keyboard controllers' non-volatile memory. At the end, FlexMatrix Tester can be used to test the keyboard matrix.

FlexMatrix keyboard controllers may work in two modes: USB interface mode and PS/2 interface mode. For USB interface mode, FlexMatrix programmer (Windows) is used to download matrix data to the controllers under Windows via a USB port. For PS/2 interface mode, there is no program to support download; therefore, the IC need be set to USB mode temperately to use this configuration feature.

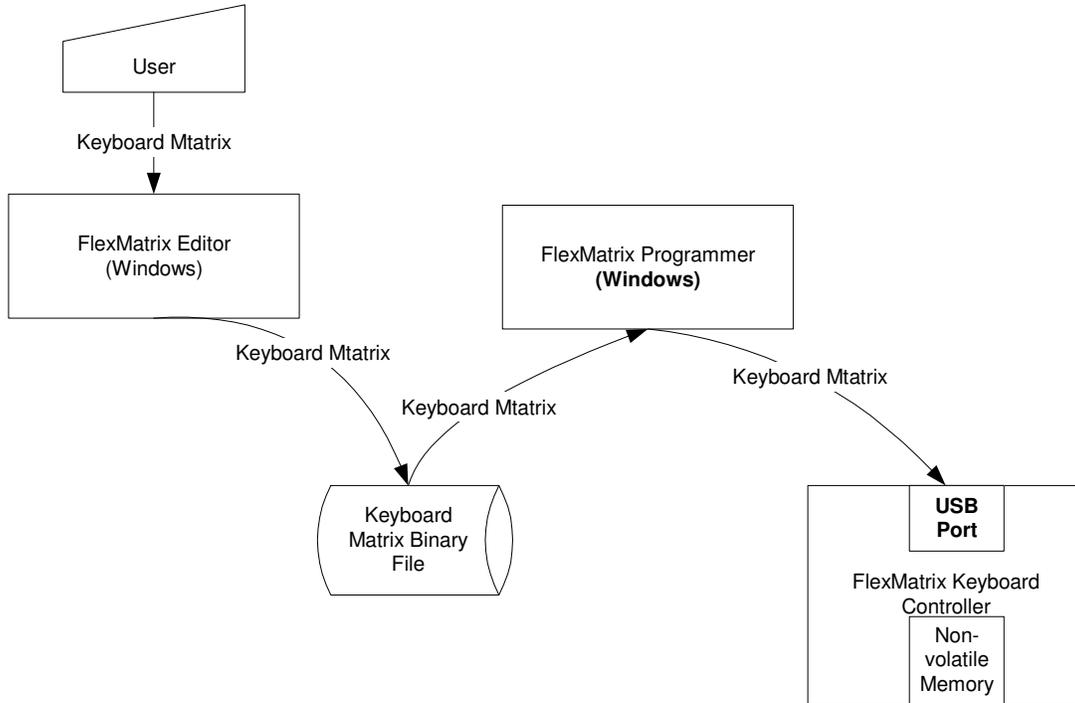


Figure 5 – Customization Workflow for FlexMatrix Controller

4 Download a Matrix File to FlexMatrix Controller

Follow the steps below to download a matrix data to FlexMatrix controller.

- Step1 – Run FlexMatrix Programmer software in Windows;
- Step2 – Click Load button and select the matrix data file;
- Step3 – Plug FlexMatrix keyboard into PC’s USB port;
- Step4 – Click Program & Verify button to download the matrix data file.
- Step5 – “Verification - Passed” shall be shown at the end of message list box.
- Step6 – Repeat Step3 to Step5 for next keyboard controller.

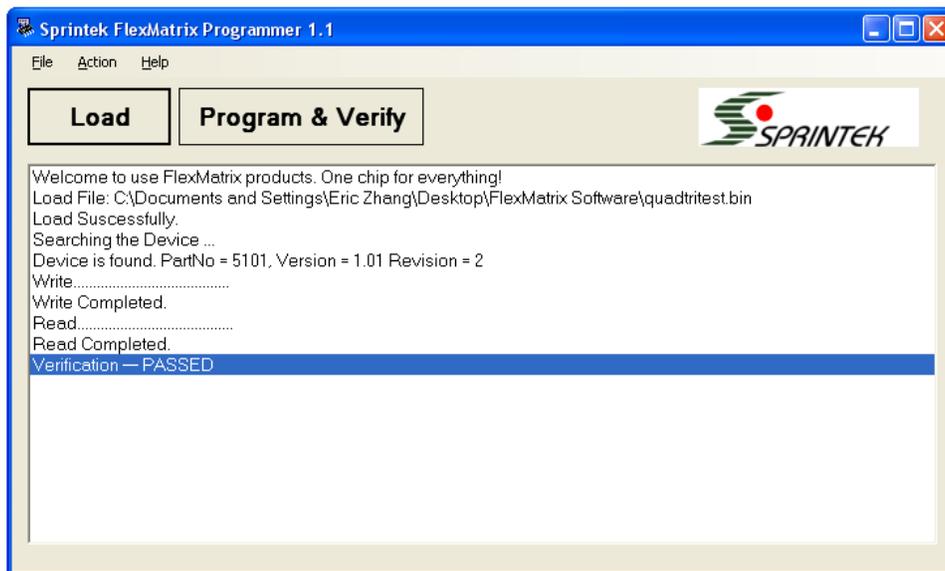


Figure 6 – FlexMatrix Programmer

5 Customize Keyboard Matrix

5.1 Concept of Matrix Tables

FlexMatrix keyboard controllers support four key matrix tables. Fn state is controlled by Fn key; Numlock state is the state of Numlock LED controlled by Numlock key. Each table has 160 keys, which is a 20-columns-8-rows matrix. The four matrix tables are configured as below.

Matrix0 – Fn Off, Numlock Off

Matrix1 – Fn Off, Numlock On

Matrix2 – Fn On, Numlock Off

Matrix3 – Fn On, Numlock On

If you don't have Fn key in your design, you may ignore Matrix2 and Matrix3 assignment.

Each location in the table can be assigned to a Sprintek key (SKEY). There are 256 SKEYs. Most SKEYs are predefined to USB or PS/2 scan code; but they can be redefined through "MacroFuncKey0" to "MacroFuncKey5" tabpage.

FlexMatrix controllers have default matrix when they are shipped. The default matrix tables can be found in the datasheets. If your design maps the default matrix tables, you can use the ICs directly.

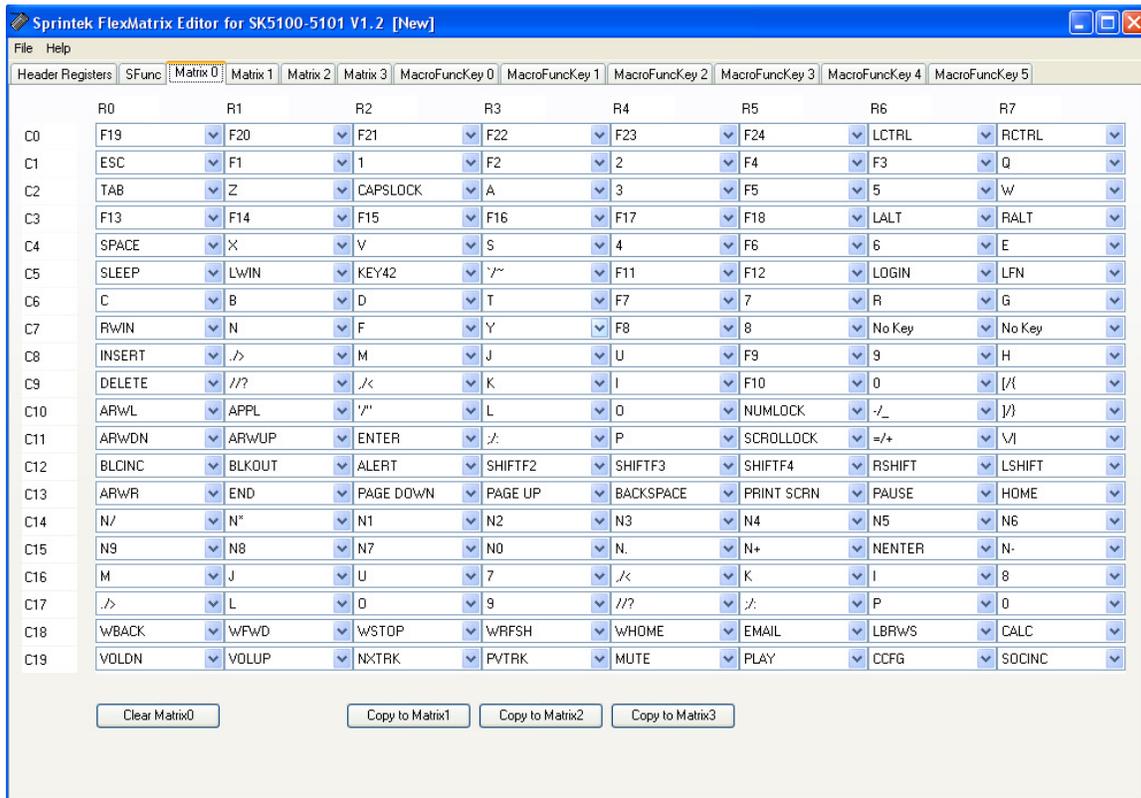


Figure 7 – Edit Matrix Tables

5.2 Assign a Key to a Location (Row, Column)

Each location need be assigned four keys for different Fn and Numlock state cases.

Example 1: Map Four Normal Keys to One Location

This example maps four keys “U”, “ARWUP”, “PAGE UP”, “VOLUP” to Matrix0-3 location R0C0 respectively.

Matrix #	Matrix Case	SKEY	Description
0	Fn Off, Numlock Off	U	Keyboard u and U
1	Fn Off, Numlock On	ARWUP	Keyboard UpArrow
2	Fn On, Numlock Off	PAGE UP	Keyboard PageUp
3	Fn On, Numlock On	VOLUP	Volume Up

The following pictures show the assignment in FlexMatrix Editor software.

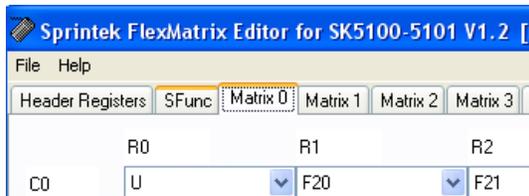


Figure 8 – U in Matrix 0

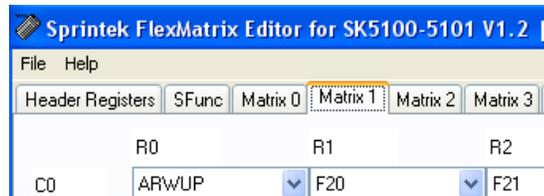


Figure 9 – ARWUP in Matrix 1

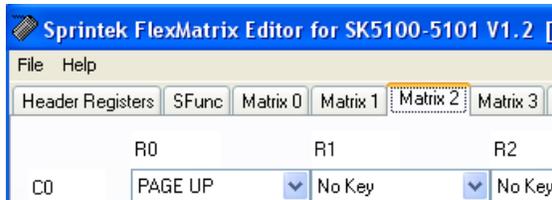


Figure 10 – PAGE UP in Matrix 2

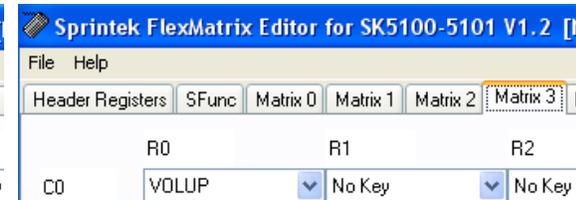


Figure 11 – VOLUP in Matrix 3

Example 2: Map Normal Key, Macro Key, Function Key to One Location

This example maps four keys “L”, “LOGIN”, “GPO0”, “BLCINC” to Matrix0-3 location R0C0 respectively. Macro keys and function keys can be defined or redefined through FlexMatrix Editor tabpage “MacroFuncKey0” to “MacroFuncKey5”.

Matrix #	Matrix Case	SKEY	Description
0	Fn Off, Numlock Off	L	Keyboard I and L
1	Fn Off, Numlock On	LOGIN	Macro key. LCTRL + LALT + DEL
2	Fn On, Numlock Off	GPO0	When key is pressed, GPO0 is driven to low; when key is released, GPO is driven to high.
3	Fn On, Numlock On	BLCINC	Backlight brightness cycle increase.

The following pictures show the assignment in FlexMatrix Editor software.

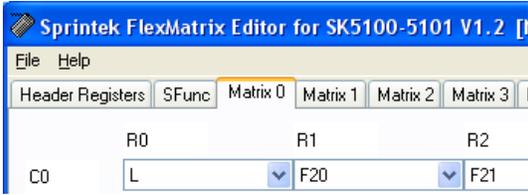


Figure 12 – L in Matrix 0

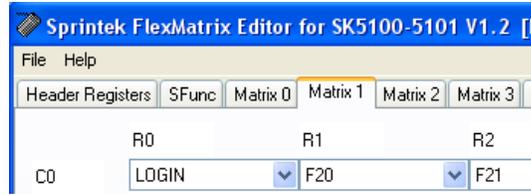


Figure 13 – LOGIN in Matrix 1

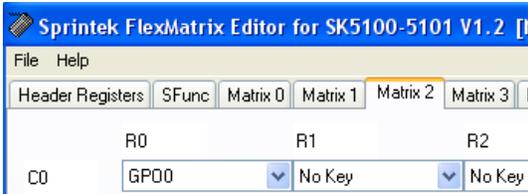


Figure 14 – GPO0 in Matrix 2

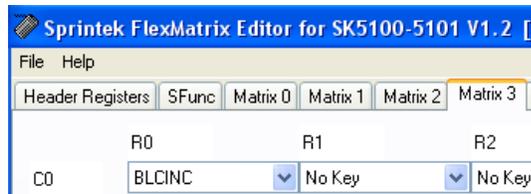


Figure 15 – BLCINC in Matrix 3

5.3 Define a Macro Key

A macro key is a combination of up to 5 keys. These element keys can be normal keys or function keys. A macro key cannot be nested into another macro key.

Example 1: Use a Macro Key to Generate ‘#’

To generate letter “#” in normal keyboard, we need press “SHIFT” key and “2” key. FlexMatrix keyboard controllers allow users to get “#” output by pressing only one key. This example defines “CUST_41” to combination of “LSHIFT” and “2”. Then follow “Assign a Key to a Location” procedure to assign “CUST_41” to Matrix0 to Matrix3.

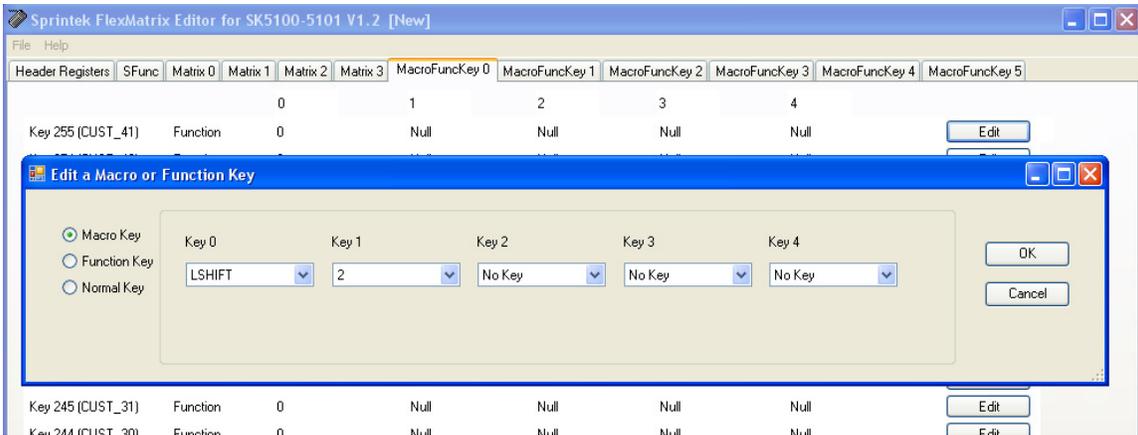


Figure 16 – Define a Macro Key of “#”

Example 2: Associate a GPO pin with a Normal Key

This example defines that “CUST_40” associates GPO0 pin with “A” key. When “CUST_40” is pressed, “A” letter down event is reported and GPO0 is driven to low; when “CUST_40” is released, “A” letter up event is reported and GPO0 is driven to high.

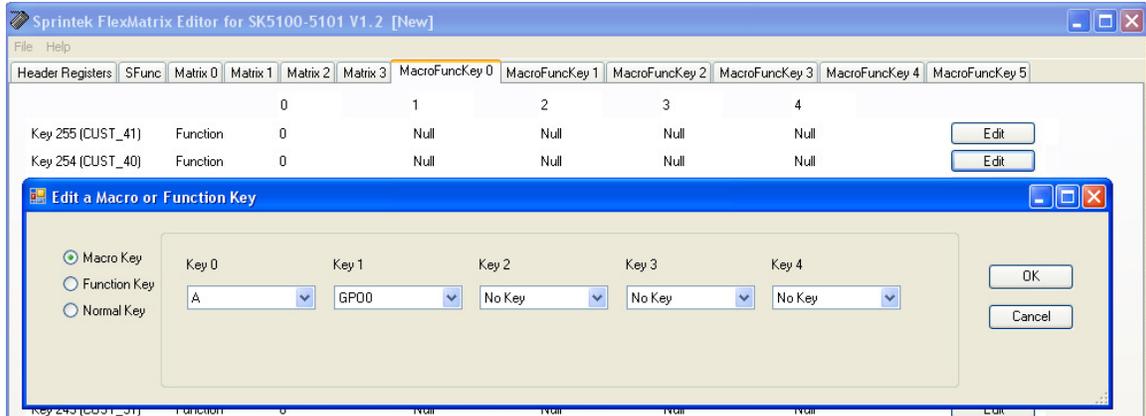


Figure 17 – Define a Key Associated with GPO pin

5.4 Three Types of Macro Key in SK5102, SK5120, SK5122

SK5102/5120/5122 support 3 types of macro keys: make-all-break-all, sequential-at-press, sequential-at-release. The make-all-break-all is same to the standard macro key definition in SK5100/SK5101 described in previous section. Besides the short definition support up to 5 keys, SK5102/5122 also support extended long definition which can be extended up to 29 keys;

Make-all-break-all: When the physical key is pressed, the Key0 to Key4’s make codes are sent to the system in order; when the physical key is released, the key4 to key0’s break codes are sent to the system in order. For example, generate keys LCTRL+LALT+DEL to pop up task window.

Sequential-at-press: When the physical key is pressed, the key0’s make code and break code are sent to the system; then so do key1, key2, key3 and key4; when the physical key is released, nothing is sent. For example, generate ‘0’, ‘0’ and ‘0’ sequentially to get text “000” at key press.

Sequential-at-release: When the physical key is released, the key4’s make code and break code are sent to the system; then so do key3, key2, key1 and key0; when the physical key is pressed, nothing is sent.

Modifier Key Toggle Features: For Sequential-at-press and Sequential-at-release keys, modifier key toggle feature is supported. CapsLock in the sequence will turn off current CapsLock LED setting; LShift/RShift will toggle current LShift/RShift status; LControl/RControl will toggle current LControl/RControl status; LAlt/RAlt will toggle current LAlt/RAlt status. At the end of execution, the original setting will be recovered.

Note: The modifier feature is supported by SK5102 V1.02 or later; SK5122 V1.02 or later.

Example 1: Use a Macro Key to Generate ‘000’

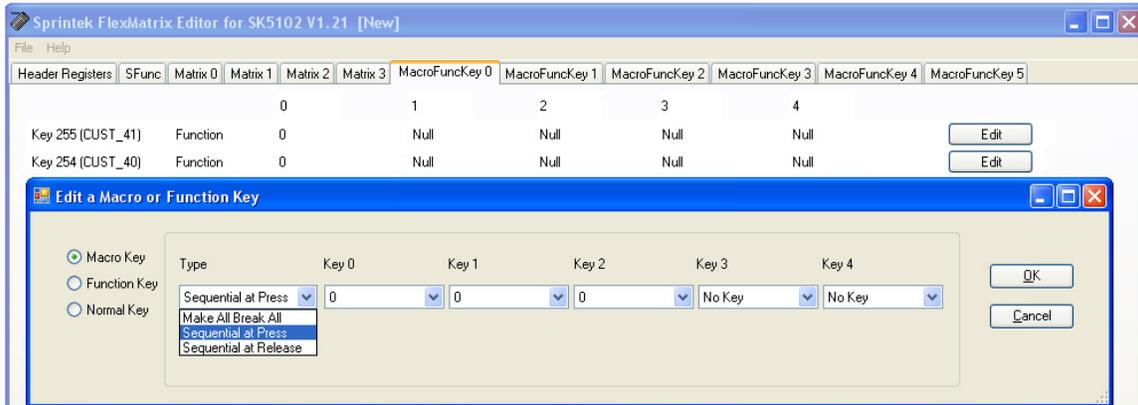


Figure 18 – Define a Key to Generate “000”

Example 2: Use a Macro Key to Generate ‘Diet Coke’

Press button “ExtMacro” to define up to 29-key macro key. This feature is only supported by SK5102 and SK5122.

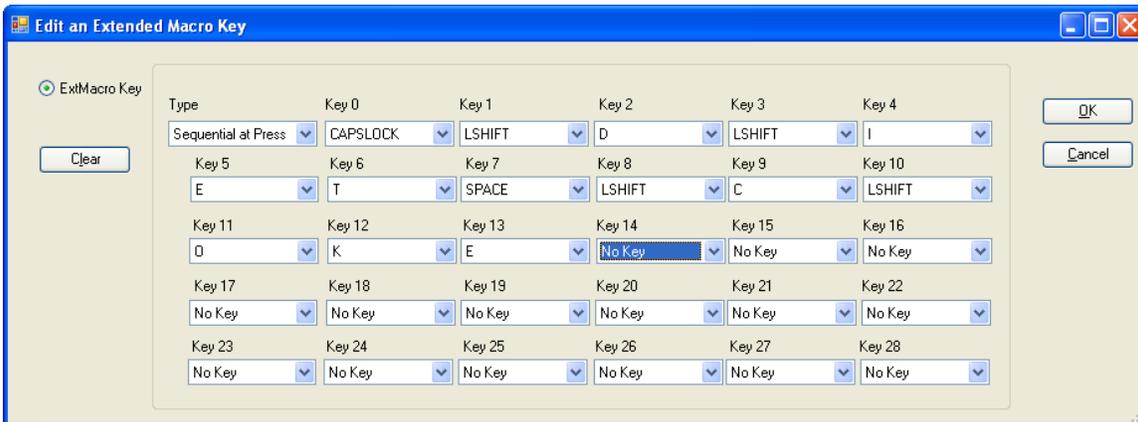


Figure 19 – Define a Key to Generate “Diet Coke”

5.5 Define a Function Key

A function key can be defined as a group of up to 4 Sprintek functions (SFunc). A function can be triggered at when the key is pressed (make effective) or when the key is released (break effective).

The SK5100/SK5101 supports the following SFunc.

SFunc	Description
LFn	LFn function
RFn	RFn function

Backlight Cycle Inc	Backlight PWM brightness increase in cycle
Backlight Cycle Dec	Backlight PWM brightness decrease in cycle
Backlight Inc	Backlight PWM brightness increase
Backlight Dec	Backlight PWM brightness decrease
Backlight Toggle	Backlight PWM brightness toggle
Backlight Off	Backlight PWM brightness is off
Backlight On	Backlight PWM brightness is on
SCO Cycle Inc	SCO increase in cycle
SCO Cycle Dec	SCO decrease in cycle
SCO Inc	SCO increase
SCO Dec	SCO decrease
Alert LED	Alert LED
GPO # Low	GPO # is driven to low. # is from 0 to 7
GPO # High	GPO # is driven to high. # is from 0 to 7
GPO # Toggle	GPO # toggle output. # is from 0 to 7

The SK5102/SK5120/SK5122 supports the following additional SFunc besides above.

SFunc	Description
KeyMs LBtn Down	Simulate mouse left button is pressed
KeyMs RBtn Down	Simulate mouse right button is pressed
KeyMs MBtn Down	Simulate mouse middle button is pressed
KeyMs 4Btn Down	Simulate mouse 4 th button is pressed
KeyMs 5Btn Down	Simulate mouse 5 th button is pressed
KeyMs Z Plus Down	Simulate mouse scroll down output
KeyMs Z Minus Down	Simulate mouse scroll up output
KeyMs X Plus Down	Simulate mouse X positive movement
KeyMs X Minus Down	Simulate mouse X minus movement
KeyMs Y Plus Down	Simulate mouse Y positive movement
KeyMs Y Minus Down	Simulate mouse Y minus movement
KeyMs LBtn Up	Simulate mouse left button is released
KeyMs RBtn Up	Simulate mouse right button is released
KeyMs MBtn Up	Simulate mouse middle button is released
KeyMs 4Btn Up	Simulate mouse 4 th button is released
KeyMs 5Btn Up	Simulate mouse 5 th button is released
KeyMs Z Plus Up	Stop simulating mouse scroll down output
KeyMs Z Minus Up	Stop simulating mouse scroll up output
KeyMs X Plus Up	Stop simulating mouse X positive movement
KeyMs X Minus Up	Stop simulating mouse X minus movement
KeyMs Y Plus Up	Stop simulating mouse Y positive movement
KeyMs Y Minus Up	Stop simulating mouse Y minus movement

Example 1: A Key-Controlled GPO Key

This example demonstrates that a key press to control a GPO pin output state. When the key is pressed, the GPO outputs low; when the key is released, the GPO outputs high.



Figure 20 – Define a Key-Controlled GPO Key

6 Design Backlight

6.1 Method 1 – Backlight PWM Control

FlexMatrix keyboard controllers control a PWM output to control the backlight brightness. A function key associated to a SFunc backlight function can control the PWM high duty of the BKPWM pin output. The demo backlight circuit is drawn in the datasheet. You may use this PWM output to control any PWM compatible circuit.

This feature is supported by SK5100, SK5101 and SK5102; NOT supported by SK5120 and SK5122.

SFunc	Description
Backlight Cycle Inc	Backlight PWM brightness increase in cycle. When the level reaches the highest, it wraps to the lowest level.
Backlight Cycle Dec	Backlight PWM brightness decrease in cycle. When the level reaches the lowest, it wraps to the highest level.
Backlight Inc	Backlight PWM brightness increase. When the level reaches the highest, it stays at the highest level.
Backlight Dec	Backlight PWM brightness decrease. When the level reaches the lowest, it stays at the lowest level.
Backlight Toggle	Backlight PWM brightness toggle. Toggle between level 0 and the highest level.
Backlight Off	Backlight PWM brightness is off. Set the level to 0.
Backlight On	Backlight PWM brightness is on. Set the level to the highest level.

The backlight PWM control parameters are defined in “Backlight PWM” section of FlexMatrix Editor tabpage “SFunc”.

Backlight PWM

PWM Period (1 Hex)

PWM Level Number (1 Hex)

AutoOn When Key Pressed

PWM Power On Level (1 Hex)

PWM Level Table (16 Hex)

<input type="text" value="00"/>	<input type="text" value="10"/>	<input type="text" value="20"/>	<input type="text" value="00"/>				
<input type="text" value="00"/>							

PWM AutoOff Time (1 Hex)

Figure 21 – Backlight PWM Parameters

Parameters	Description
PWM Period	The PWM one cycle period time based on a 32k clock.
PWM Level Number	The total level number defined in PWM level table. The effective level definition is from index 0 to index “PWM Level Number” – 1.
PWM Power On Level	Backlight level when power on,
AutoOn When Key Pressed	When this is checked, the backlight is automatically turned on when a key is pressed.
PWM Level Table	The elements define the high time based on 32k clock. When the time is larger than period, it means always high. 16 levels can be defined at maximum.
PWM AutoOff Time	The time is kept on after no key is pressed. The LSB is 0.5second.

6.2 Method 2 – Backlight GPO Control

FlexMatrix keyboard controllers control a group GPO pin output to control the backlight brightness. A function key associated to a SFunc backlight function can control the GPO pin state. You may use these GPOs to control current sensing resistor combination to set different brightness.

This feature is supported by SK5120 and SK5122; NOT supported by SK5100, SK5101 and SK5102.

SFunc	Description
Backlight Cycle Inc	Backlight brightness increase in cycle. When the level reaches the highest, it wraps to the lowest level.
Backlight Cycle Dec	Backlight brightness decrease in cycle. When the level reaches the lowest, it wraps to the highest level.

Backlight Inc	Backlight brightness increase. When the level reaches the highest, it stays at the highest level.
Backlight Dec	Backlight brightness decrease. When the level reaches the lowest, it stays at the lowest level.
Backlight Toggle	Backlight brightness toggle. Toggle between level 0 and the highest level.
Backlight Off	Backlight brightness is off. Set the level to 0.
Backlight On	Backlight brightness is on. Set the level to the highest level.

The backlight control parameters are defined in “Backlight GPO” section of FlexMatrix Editor tabpage “SFunc”.

Figure 22 – Backlight GPO Parameters

The following table is valid for SK5120 and SK5122.

- BIT3 - GPO0
- BIT5 - GPO1
- BIT7 - GPO2

Parameters	Description
Backlight GPO Mask	Enable mask bits for GPOs to jointly control backlight. 1=enable. Bit3,5 and 7 are valid.
Backlight Level Number	The total level number defined in level table. The effective level definition is from index 0 to index “Level Number” – 1.
Backlight Power On Level	Backlight level when power on.
AutoOn When Key Pressed	When this is checked, the backlight is automatically turned on when a key is pressed.
Backlight Level Table	The elements define GPO combination state. Bit3,5 and 7 are valid.
Backlight AutoOff Time	The time is kept on after no key is pressed. The LSB is 0.5second.

6.3 Method 3 – Use SCO to Implement a Backlight Control

An alternative way to control backlight brightness is to use SCO feature. Some backlight circuit brightness is controlled by changing the current sensing resistance. The resistance is controlled by controlling MOSFET open/close to some resistors.

You can use SCO to control a group GPO pins output that controls which resistors are in the circuit. The detailed description is in SCO configuration section.

6.4 Method 4 – Use GPO to Implement a Backlight ON/OFF Control

If you have only two levels: ON/OFF, you may use a GPO pin to control the backlight on/off. The backlight circuit can be a high efficiency switching regulator based circuit or a simple resistor driven circuit.

7 GPO Configuration

The FlexMatrix Controllers provide eight GPO pins. A function key associated to SFunc GPO functions can control the GPO pins. These key-controlled GPOs can be used to control LCD brightness, audio volume by hardware signals, blackout LEDs.

The FlexMatrix Controllers support the following SFunc.

SFunc	Description
GPO # Low	GPO # is driven to low. # is from 0 to 7
GPO # High	GPO # is driven to high. # is from 0 to 7
GPO # Toggle	GPO # toggle output. # is from 0 to 7

The GPO configuration parameters are defined in “GPO & SCO” section of FlexMatrix Editor tabpage “SFunc”.

GPO & SCD

GPO Power On State (1 Hex)

GPO Config0 (1 Hex)

GPO Config1 (1 Hex)

SCD State Number (1 Hex)

SCD Power On State (1 Hex)

SCD State Table (16 Hex)

<input type="text" value="03"/>	<input type="text" value="02"/>	<input type="text" value="00"/>					
<input type="text" value="00"/>							

SCD GPO Mask (1 Hex)

Figure 23 – GPO Parameters

The following table is valid for SK5100, SK5101 and SK5102.

Parameters	Description																				
GPO Power On State	GPO output state after power on. Bit0 to Bit7 is mapped to the state of GPO0 to GPO7. 1=High; 0=Low.																				
GPO Config0, Config1	GPO Config1 and Config0's Bit0 to Bit7 are mapped to the control mode of GPO0 to GPO7. <table border="1" data-bbox="630 1150 1230 1354"> <thead> <tr> <th>Config1,0</th> <th>Drive Mode</th> <th>Data0</th> <th>Data1</th> </tr> </thead> <tbody> <tr> <td>00</td> <td>Resistive Pull Down</td> <td>Resistive</td> <td>Strong</td> </tr> <tr> <td>01</td> <td>Strong Drive</td> <td>Strong</td> <td>Strong</td> </tr> <tr> <td>10</td> <td>High Impedance</td> <td>Hi-Z</td> <td>Hi-Z</td> </tr> <tr> <td>11</td> <td>Resistive Pull Up</td> <td>Strong</td> <td>Resistive</td> </tr> </tbody> </table>	Config1,0	Drive Mode	Data0	Data1	00	Resistive Pull Down	Resistive	Strong	01	Strong Drive	Strong	Strong	10	High Impedance	Hi-Z	Hi-Z	11	Resistive Pull Up	Strong	Resistive
Config1,0	Drive Mode	Data0	Data1																		
00	Resistive Pull Down	Resistive	Strong																		
01	Strong Drive	Strong	Strong																		
10	High Impedance	Hi-Z	Hi-Z																		
11	Resistive Pull Up	Strong	Resistive																		

The following table is valid for SK5120 and SK5122.

- BIT3 - GPO0
- BIT5 - GPO1
- BIT7 - GPO2
- BIT4 - XPS2D
- BIT6 - XPS2C

Parameters	Description
GPO Power On State	GPO output state after power on. Bit3, Bit5 and Bit7 are mapped to the state of GPO0 to GPO2. 1=High; 0=Low. The Bit4 and Bit6 are forced to proper state by the IC.
GPO Config0, Config1	GPO Config1 and Config0's Bit3, Bit5 and Bit7 are mapped to the control mode of GPO0 to GPO2;

Bit4 and Bit6 are mapped to control XPS2D,XPS2C.			
Config1,0	Drive Mode	Data0	Data1
00	Resistive Pull Up	Strong	Resistive
01	Strong Drive	Strong	Strong
10	High Impedance	Hi-Z	Hi-Z
11	Open Drain	Strong	Hi-Z

8 SCO Configuration

The FlexMatrix Controllers provide eight GPO pins. These GPOs can be grouped together and is controlled by one function. A function key associated to SFunc SCO functions can control the group of GPO pins. These key-controlled SCO pins can be used to control a state-machine logic.

The FlexMatrix controllers support the following SFunc.

SFunc	Description
SCO Cycle Inc	SCO increase in cycle. When the state reaches the highest, it wraps to the lowest state.
SCO Cycle Dec	SCO decrease in cycle. When the state reaches the lowest, it wraps to the highest state.
SCO Inc	SCO increase. When the state reaches the highest, it stays at the highest state.
SCO Dec	SCO decrease. When the state reaches the lowest, it stays at the lowest state.

The SCO configuration parameters are defined in “GPO & SCO” section of FlexMatrix Editor tabpage “SFunc”.

GPO & SCO

GPO Power On State (1 Hex)

GPO Config0 (1 Hex)

GPO Config1 (1 Hex)

SCO State Number (1 Hex)

SCO Power On State (1 Hex)

SCO State Table (16 Hex)

03	02	00	00	00	00	00	00
00	00	00	00	00	00	00	00

SCO GPO Mask (1 Hex)

Figure 24 – SCO Parameters

Parameters	Description
SCO State Number	The total level number defined in SCO state table. The effective state definition is from index 0 to index “SCO State Number” – 1.
SCO Power On State	SCO output state after power on.
SCO State Table	The elements define the GPO output for the state. 16 states can be defined at maximum. The Bit0 to Bit7 of a state are mapped to the physical port output pin.
SCO GPO Mask	Defines which GPOs are grouped to SCO control logic. The Bit0 to Bit7 are mapped to the enable bit of the physical port output. 1 = Enabled to be grouped to SCO; 0 = Disabled.

The following table is valid for SK5100, SK5101 and SK5102.
BIT0 to BIT7 - GPO0 to GPO7

The following table is valid for SK5120 and SK5122.
BIT3 - GPO0
BIT5 - GPO1
BIT7 - GPO2

9 LED Driver Configuration

The FlexMatrix Controllers provide six direct LED drivers to drive Fn, Numlock, Scrolllock, Capslock, Composite, Kana LEDs. These LEDs is controlled by its own keyboard logic.

The LED configuration parameters are defined in “LEDs, Suspend & Alert LED” section of FlexMatrix Editor tabpage “SFunc”.

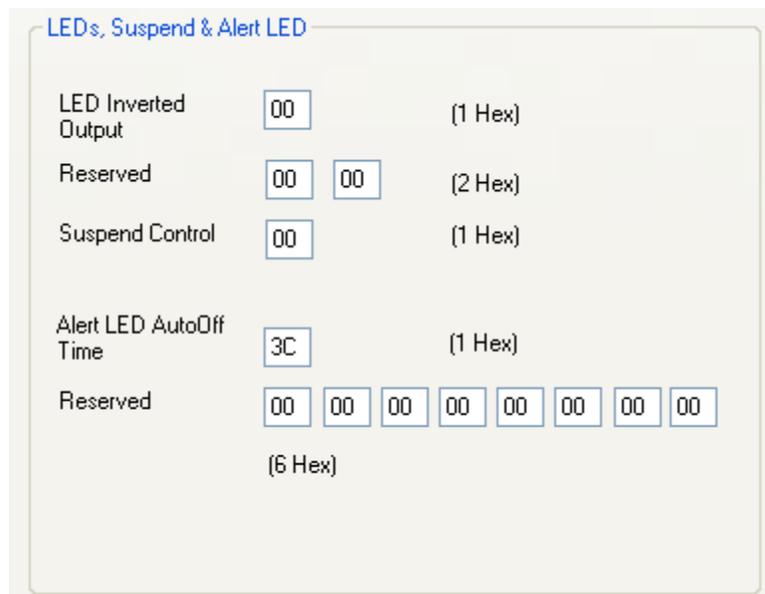


Figure 25 – LEDs Parameters

Parameters	Description
LED Inverted Output	Invert the output logic. 1 = Inverted; 0 = Normal. In normal mode, LED on means the output is low. Bit0: NumLock LED output mode; Bit1: CapsLock LED output mode; Bit2: ScrollLock LED output mode; Bit3: Composite LED output mode; Bit4: Kana LED output mode; Bit5: Fn LED output mode.
Suspend Control	Bit0: 0 = Turned off LEDs and PWM backlight during USB suspend, restore their original state after wakeup; 1 = Keep their existing settings during USB suspend.
Alert LED AutoOff Time	Automatically turn off alert LED after the specified time in this field. LSB is 0.5 second.

10 KeyMouse Configuration

The FlexMatrix Controller SK5102, SK5120 and SK5122 can simulate mouse functions by mapping keyboard keys. A function key associated to SFunc KeyMs functions can simulate mouse movement and mouse button operations.

SFunc	Description
KeyMs LBtn Down	Simulate mouse left button is pressed
KeyMs RBtn Down	Simulate mouse right button is pressed
KeyMs MBtn Down	Simulate mouse middle button is pressed
KeyMs 4Btn Down	Simulate mouse 4 th button is pressed
KeyMs 5Btn Down	Simulate mouse 5 th button is pressed
KeyMs Z Plus Down	Simulate mouse scroll down output
KeyMs Z Minus Down	Simulate mouse scroll up output
KeyMs X Plus Down	Simulate mouse X positive movement
KeyMs X Minus Down	Simulate mouse X minus movement
KeyMs Y Plus Down	Simulate mouse Y positive movement
KeyMs Y Minus Down	Simulate mouse Y minus movement
KeyMs LBtn Up	Simulate mouse left button is released
KeyMs RBtn Up	Simulate mouse right button is released
KeyMs MBtn Up	Simulate mouse middle button is released
KeyMs 4Btn Up	Simulate mouse 4 th button is released
KeyMs 5Btn Up	Simulate mouse 5 th button is released
KeyMs Z Plus Up	Stop simulating mouse scroll down output
KeyMs Z Minus Up	Stop simulating mouse scroll up output
KeyMs X Plus Up	Stop simulating mouse X positive movement
KeyMs X Minus Up	Stop simulating mouse X minus movement
KeyMs Y Plus Up	Stop simulating mouse Y positive movement
KeyMs Y Minus Up	Stop simulating mouse Y minus movement

At default, SK5102, SK5120 and SK5122 have defined a set of function keys to operate KeyMouse.

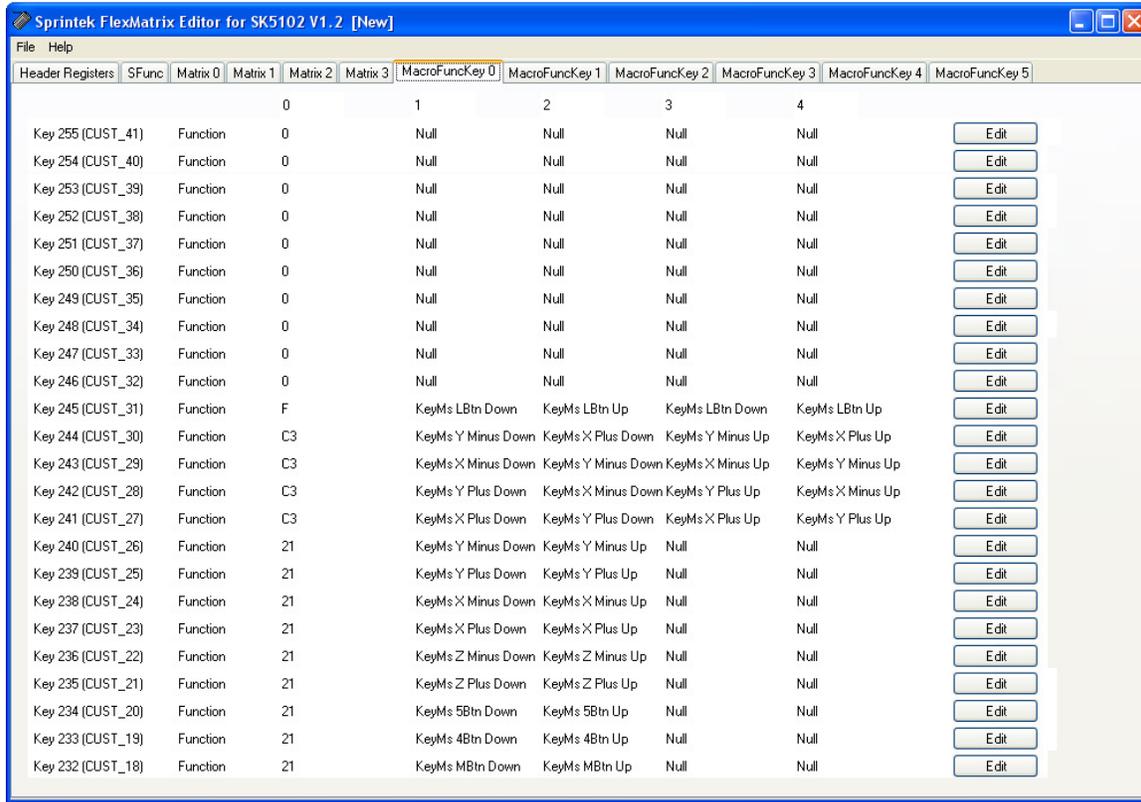


Figure 26 – Default KeyMouse Function Key Definition

11 AB Rotary Encoder – Key Mapped

The FlexMatrix Controller SK5102 supports AB rotary encoder. The IC maps clockwise and counterclockwise movement to a key location. The key location is defined in Matrix0 to Matrix3.

The LED configuration parameters are defined in “LEDs, Suspend & Alert LED” section of FlexMatrix Editor tabpage “SFunc”.

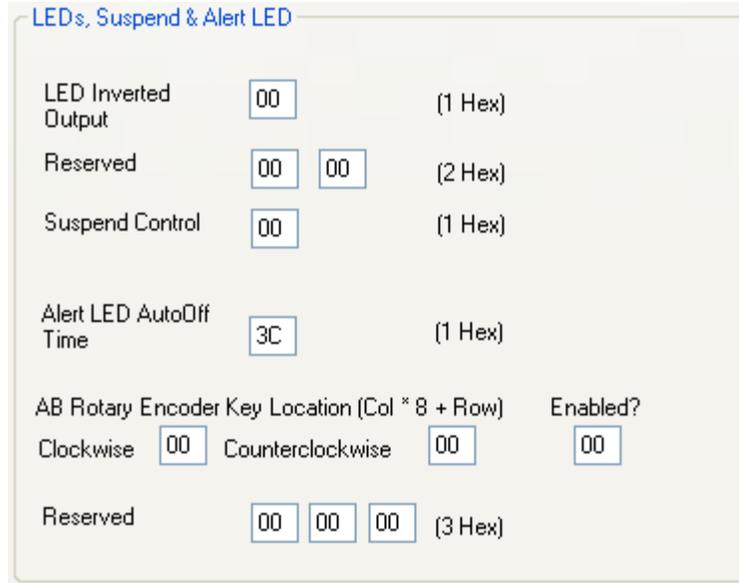
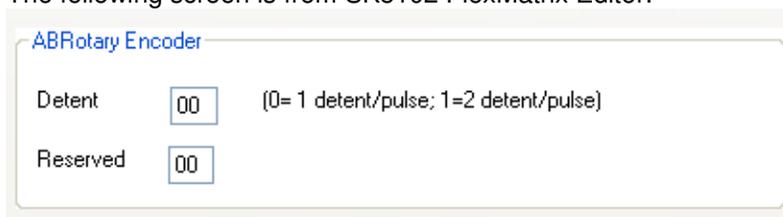


Figure 27 – LEDs Parameters

Parameters	Description
AB Rotary Encoder Enabled	00 = Disabled; 01 = Enabled.
Clockwise Key Location	Bit0-Bit2 = Row number; Bit3-Bit7 = Column number.
Counterclockwise Key Location	Bit0-Bit2 = Row number; Bit3-Bit7 = Column number.

The AB Rotary Encoder has two types: 1 detent/pulse and 2 detent/pulse. The correct setting must be set accordingly. For no detent AB rotary encoder, any of them will work and the difference is the output speed.

The following screen is from SK5102 FlexMatrix Editor.



12 History

Version	Date	Description
V1.01	2009-10-12	Initial Release
V1.02	2011-09-06	Added SK5120, SK5122 into the application notes; updated SK5102 macro key support and AB rotary encoder support.