



SK5210 FlexMatrix™ Keyboard Controller

Low Power User Programmable USB and HID-over-I2C Dual Interface
Keyboard Encoder with 1 External PS/2 Port, 1 PWM Backlight, 7 LEDs
Control, and Field-Upgradable Bootloader

FEATURES

- Full speed USB 2.0 HID and HID over I2C 1.0 dual interfaces with Bootloader for field upgrade
- One external PS/2 interface to PS/2 device such as mouse, touchpad, pointing stick, and keyboard
- 7 LEDs (4 shared with column scan pins)
- 1 PWM backlight brightness control
- FN key support
- 8 x 20 matrix keyboard scan
- User-Programmable keyboard matrix
- 4 Matrix Tables for LFn, RFn, NumLock cases
- Support macro keys to generate like international characters “€”, “¥”, “♪”, “Ctrl+Alt+Del”, or “Coke Cola”, “000” sequential string outputs
- USB and I2C can have different scan code reports for the same key event
- PS/2 command relay support
- Advanced ghost key detection algorithm to maximize the key combination without additional diodes
- HID over I2C interface supports standard commands:
 - RESET
 - GET_REPORT
 - SET_REPORT
 - SET_POWER
- Built-in oscillator and digital circuit. No external crystal is needed
- LQFP 48 pin package: 7x7mm 1.6 Max (LxWxH)
- Low power consumption 240uA (USB), 0.3uA (I2C only)
- Operation voltage range: 3.0 to 5.5V
- Industrial temperature range: -40°C to +85°C
- Custom versions available in small and large quantities

APPLICATION

- Notebook PCs
- Desktop PCs
- Tablet PCs
- Tablet/Mobile Phone docking station
- Instruments

ORDEING INFORMATION

SK5210 LQFP 48-pin, 0.5mm pitch, (7x7mm 1.6 MAX), Pb-Free, RoHS Complaint

DESCRIPTION

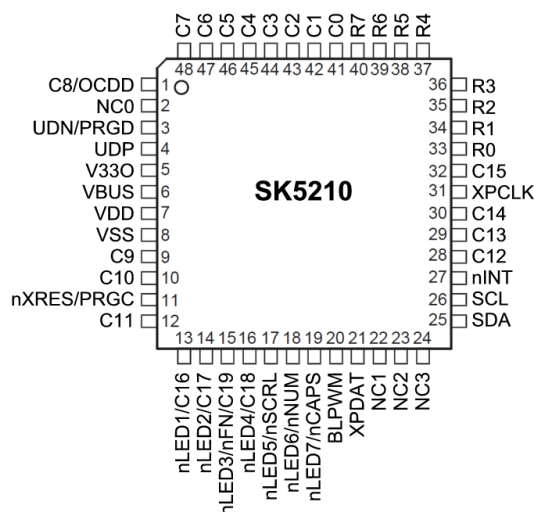
The SK5210 is a low power USB and I2C dual interface keyboard encoder with 1 PWM backlight and 7 LEDs control. While the USB interface is connected to the main PC as normal keyboard, the secondary I2C interface can be used to communicate with a system embedded controller (EC) for EC to receive all user events and get full control of the system. It's the best choice for customized keyboard design for tablet / PC / laptop / docking station / Instrument.

The SK5210 scans and encodes an 8-row by 20-column matrix. The key press events are translated to keyboard report. The encoder gets matrix information from on-chip matrix tables.

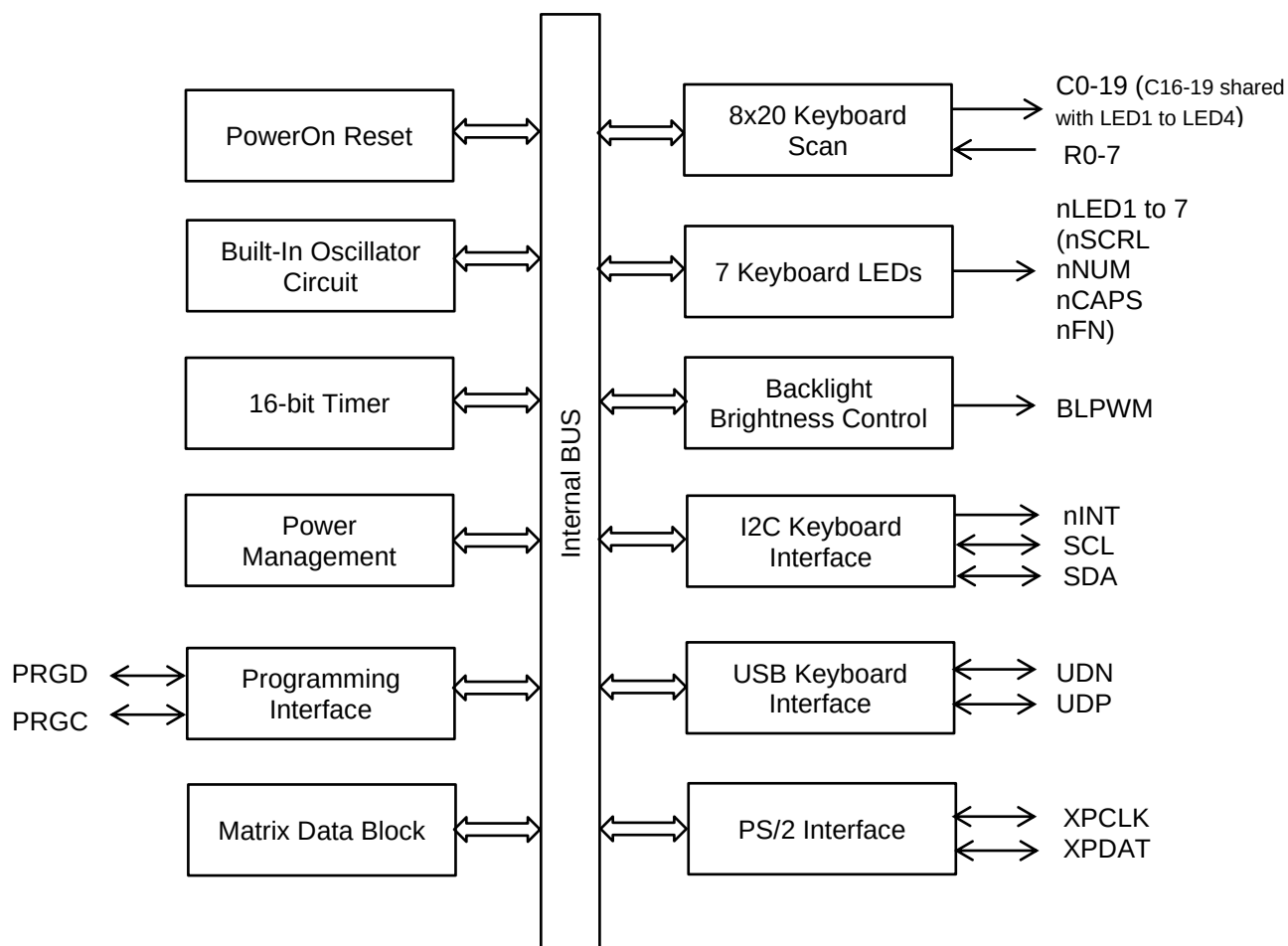
The backlight LED PWM brightness control and 7 LEDs can be controlled via the dual interfaces by commands or key press events.

The SK5210 provides an external PS/2 port that supports hot plug and hot swap of PS/2 devices such as touchpad, pointing stick, mouse including wheel mice, and keyboard. The host can send commands via SK5210 PS/2 command relay feature to the external PS/2 device to change default settings.

PIN ASSIGNMENTS



FUNCTION BLOCK DIAGRAM



PIN DEFINITION

Pin No	Type	Name	Description
1	IO	C8	Column line 8 for scan matrix
2	NA	NC0	NC pin
3	IO	UDN/PRGD	USB D- line / programming data line
4	IO	UDP	USB D+ line
5	P	V33O	USB 3.3 regulator output
6	P	VBUS	Power supply
7	P	VDD	Power supply
8	P	VSS	Ground connection
9 – 10	IO	C9 – C10	Column lines 9, 10 for scan matrix
11	I	nXRES / PRGC	External reset: low active / programming clock line
12	IO	C11	Column line 11 for scan matrix
13	O	nLED1 / C16	General LED1 / Column line 16 for scan matrix
14	O	nLED2 / C17	General LED1 / Column line 17 for scan matrix
15	O	nLED3 / nFN / C19	General LED3 / Fn lock LED / Column line 19 for scan matrix
16	O	nLED4 / C18	General LED4 / Column line 18 for scan matrix
17	O	nLED5 / nSCRL	General LED5 / Scroll lock LED
18	O	nLED6 / nNUM	General LED6 / Num lock LED
19	O	nLED7 / nCAPS	General LED7 / Caps lock LED
20	O	BLPWM	Backlight control PWM
21	IO	XPDAT	External PS/2 data line
22 – 24	NA	NC1 – NC3	NC pins
25	IO	SDA	I2C slave data line
26	IO	SCL	I2C slave clock line
27	O	nINT	I2C slave interrupt line
28 – 30	IO	C12 – C14	Column lines 12 to 14 for scan matrix
31	IO	XPCLK	External PS/2 clock line
32	IO	C15	Column line 15 for scan matrix
33 – 40	I	R0 – R7	Row lines 0 to 7 for scan matrix with internal pull-up resistor
41 – 48	IO	C0 – C7	Column lines 0 to 7 for scan matrix

LENGENG I = Input, O = Output, IO = Input/Output, P = Power

FUNCTION BLOCK DESCRIPTION

The SK5210 consists functionally of several major sections (see the block diagram on the previous page). These include power on reset, oscillator circuit, 16-bit timer, power management, programming interface, keyboard scan, keyboard LEDs, backlight brightness control, matrix data block, USB keyboard interface, I2C keyboard interface, external PS/2 interface. All sections communicate with each other and operate concurrently.

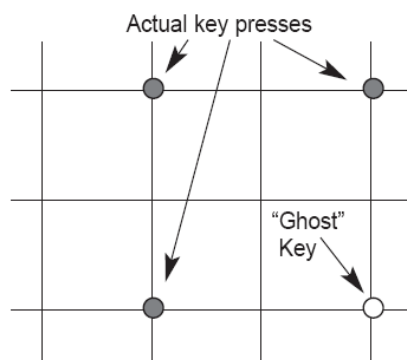
Keyboard Scan

The SK5210 scans a keyboard organized as an 8 row by 20 column matrix for a maximum of 160 keys. Smaller size matrixes can be accommodated by leaving unused pins open. The IC provides internal pull-ups for the row input pins. When active, the encoder selects each column line (C0-C19); for each column selected, it reads the row data lines (R0-R7). A key closure is detected as a zero in the corresponding position of the matrix.

Each key found pressed is debounced for a period of 20 ms. Once the key is verified, the corresponding key code(s) are loaded into the transmit buffer.

In any scanned contact switch matrix, whenever three keys defining a rectangle on the switch matrix are pressed at the same time, a fourth key positioned on the fourth corner of the rectangle is sensed as being pressed. This is known as the “ghost” or “phantom” key problem.

Although the problem cannot be totally eliminated without using external hardware, there are methods to neutralize its negative effects for most practical applications. Keys that are intended to be used in combinations should be placed in the same row or column of the matrix, whenever possible. Shift keys (Shift, Alt, Ctrl, Window, Fn) should not reside in the same row (or column) as any other keys. The SK5210 has built-in mechanisms to detect and reject “ghost” keys.



Notes: Column 16 to 19 pins are shared with LED1 to LED4.

They can be configured to be either LED functions or column functions. At default, they are configured as column function.

Pin#	LED Function Name	Keyboard Scan Function Name
13	LED1	C16
14	LED2	C17
15	LED3	C19
16	LED4	C18

When a key event is detected, it will be reported to both USB interface and HID over I2C interface. The key event can be either enabled or disabled for each interface.

Keyboard LEDs

The SK5210 provides 7 pins to directly drive LEDs for CapsLock, Numlock, Scrolllock, Fnlock functions and general LED indicators.

USB Interface

The SK5210 follows USB.org's *Universal Serial Bus Specification 2.0* and *Device Class Definition for HID 1.11* as a full speed HID keyboard device.

HID over I2C Interface

The SK5210 follows Microsoft's *HID Over I2C Protocol Specification – Device Side Version 1.00* as a HID over I2C keyboard and mouse combo device.

nINT pin can be configured to low assertion or high assertion. **nINT high assertion is default.**

Power Management

When USB interface is connected, the SK5210 supports selective suspend and remote wake up to get maximum power saving.

The host embedded controller can instruct the SK5210 to connect/disconnect USB interface to save power.

Backlight Brightness Control

The 10-bit PWM output controls the brightness of backlight circuit. The PWM clock is sourced from 12MHz clock, and the parameters such as period, positive width are programmable.

Power On Reset Circuit

The SK5210 has built-in power on reset circuit with simple external RC components.

Oscillator Circuit

The SK5210 has built-in oscillator circuit and no external crystal or resonator is needed.

16-bit Timer

The 16-bit timer provides the timing control for USB and I2C communication, keyboard scan and sleep timer wakeup.

External PS/2 Port

The SK5210 provides an external PS/2 port that supports hot plug and hot swap of PS/2 mouse including wheel mouse, and keyboard devices.

Matrix Data Block

The SK5210 provides an on-chip data block to store keyboard matrix, scan code mapping table and etc. The matrix data block is pre-defined and cannot be changed in the field. Custom matrix data block can be done via Sprintek custom keyboard service.

Programming Interface

The programming interface is reserved for Sprintek to programming new firmware. **PRGC and PRGD pins are recommended to be connected to a 6 pin header in the schematic.** The header needn't be populated in the final assembly. Three test points are preferred if 6 pin header is not allowed due to space reason.

I2C COMMAND PROTOCOL

I2C Slave Device Address

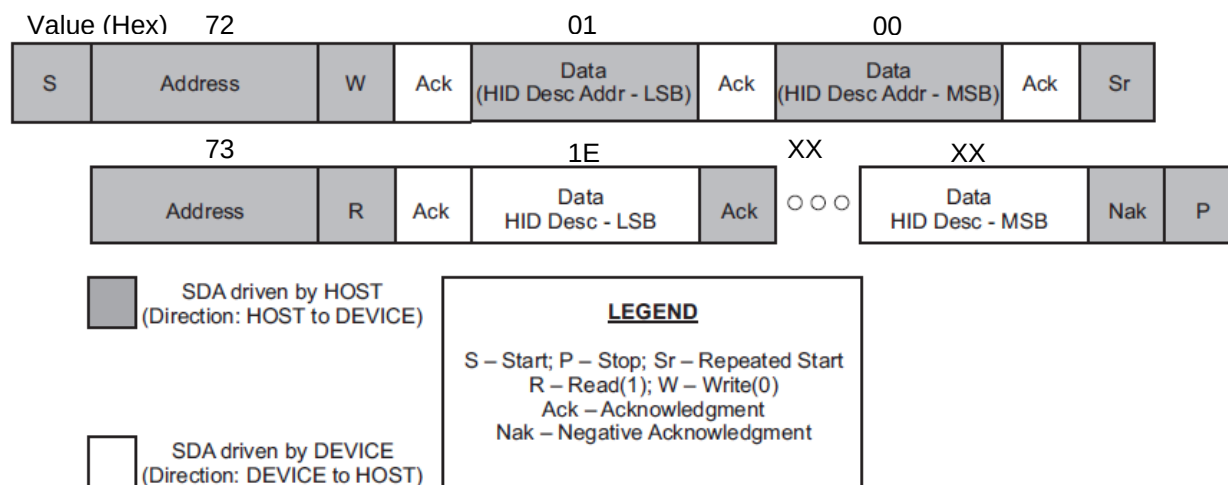
The 7-bit address of the device is shown as below 0x39. After combined with R/W bit, the 8-bit address is 0x72 for I2C write operation, 0x73 for I2C read operation.

List of Commands

The following diagram illustrates the bus communication for a data write, a data pointer write, and a data read operation. Remember that a data write operation always rewrites

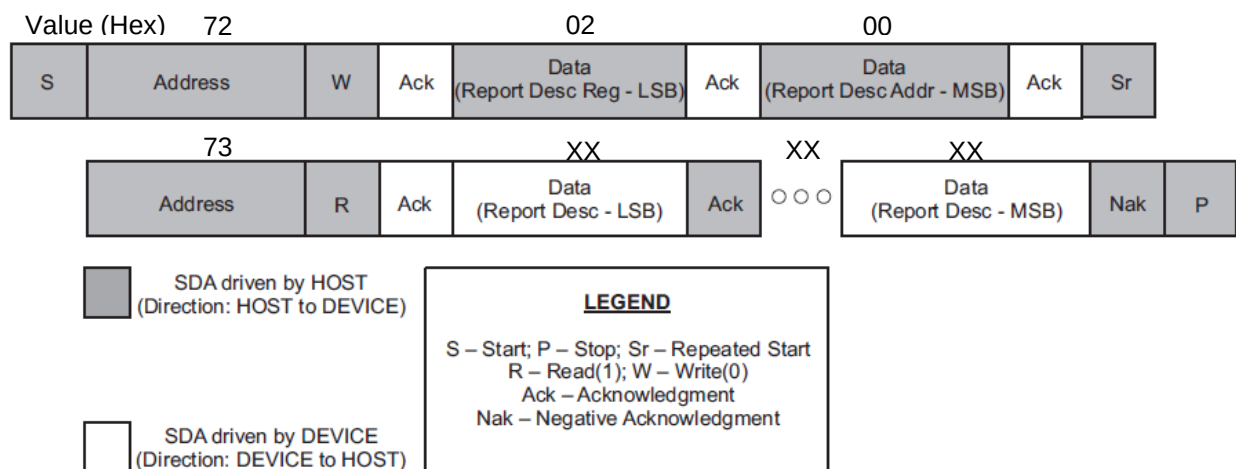
Register Address	Register Definition	R/W	Data Byte	Notes
0x0001	HID Descriptor	Read	30	
0x0002	Report Descriptor	Read	Vary	
0x0003	Input Report	Read		
0x0004	Output Report	Write		
0x0005	Command Register	Write		Support commands: RESET GET_REPORT SET_REPORT SET_POWER
0x0006	Data Register	Read/Write		

HID Descriptor Retrieval



Typical Retrieval of the HID Descriptor

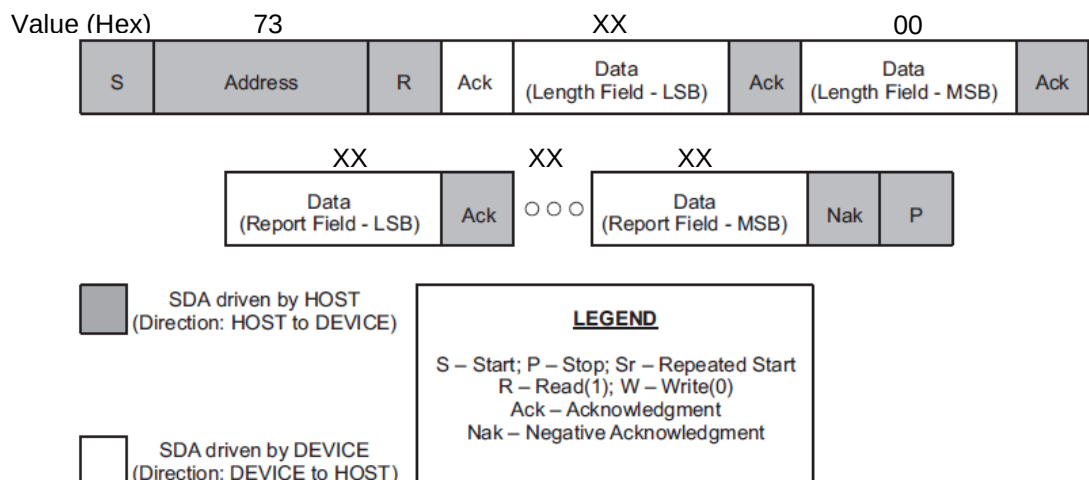
Report Descriptor Retrieval



Typical Retrieval of the Report Descriptor

The length of report descriptor is stored in HID descriptor.

Input Reports



The low byte of input report length field depends on the type of input report. Input reports are indicated by NINT assertion.

Reset Report

A reset report will be sent after the SK5210 receives powered-on-reset or after the SK5210 receives a RESET command.

Byte0	Definition	Value
0	Length Low Byte	00
1	Length High Byte	00

Keyboard Input Report (HID Page 7)

Byte0	Definition	Value
0	Length Low Byte	0B
1	Length High Byte	00
2	Report ID	01

3	Modifier Keys								XX
	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0	
	RightGUI	RightAlt	RightShift	RightCtrl	LeftGUI	LeftAlt	LeftShift	LeftCtrl	
4	Reserved								00
5	Key1 UsageID								XX
6	Key2 UsageID								XX
7	Key3 UsageID								XX
8	Key4 UsageID								XX
9	Key5 UsageID								XX
10	Key6 UsageID								XX

System ACPI Input Report (HID Page 1)

Byte0	Definition	Value
0	Length Low Byte	04
1	Length High Byte	00
2	Report ID	03
3	System Power Key1 UsageID	XX

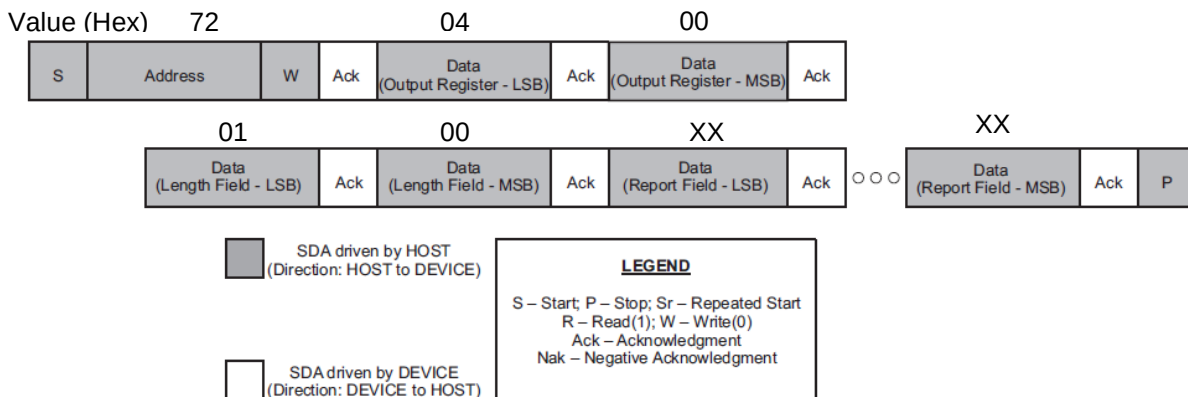
Consumer Key Input Report (HID Page C)

Byte0	Definition	Value
0	Length Low Byte	05
1	Length High Byte	00
2	Report ID	04
3	Consumer Key1 UsageID Low Byte	XX
4	Consumer Key1 UsageID High Byte	XX

Mouse Input Report

Byte0	Definition	Value	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0	Length Low Byte	06	0	0	0	0	0	1	1	0
1	Length High Byte	00	0	0	0	0	0	0	0	0
2	Report ID	02	0	0	0	0	0	0	1	0
3	Buttons	0X	0	0	0	0	0	Middle Button	Right Button	Left Button
4	X Axis Relative Movement	XX	X Data							
5	Y Axis Relative Movement	XX	Y Data							

Output Reports



Set Keyboard LEDs

Byte0	Definition	Value	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
-------	------------	-------	------	------	------	------	------	------	------	------

0	Length Low Byte	01	0	0	0	0	0	1	1	0
1	Length High Byte	00	0	0	0	0	0	0	0	0
2	Report ID	01	0	0	0	0	0	0	1	0
3	LEDs	XX	0	0	0	Kana	Compose	Scroll Lock	Caps Lock	Num Lock

Command and Data Register

The HID over I2C spec requires that all devices respond to certain commands. The commands are issued to the command register. The command is an opcode as defined by the HID over I2C spec. The operand for the command goes to the data register. Below is a list of commands supported by the SK5210.

Op Code	Command Name	Effective on Device
0001b	RESET	Device is reset and all registers are returned to default value. This command has the same effect on the device as a power on reset.
0010b	GET_REPORT	Most recent input report is transferred to Data Register
0011b	SET_REPORT	Data register contents are used to turn on/off LED.
1000b	SET_POWER	All LEDs are turned off, USB interface is shut down and disconnected from USB bus, and device is in lowest current mode (will still detect key presses)

KEYBOARD MATRIX DESIGN

Four Keyboard Matrix

The SK5210 supports four 8X20 keyboard matrixes for the following cases: LFn off/on, RFn off/on.

Design Keyboard Matrix

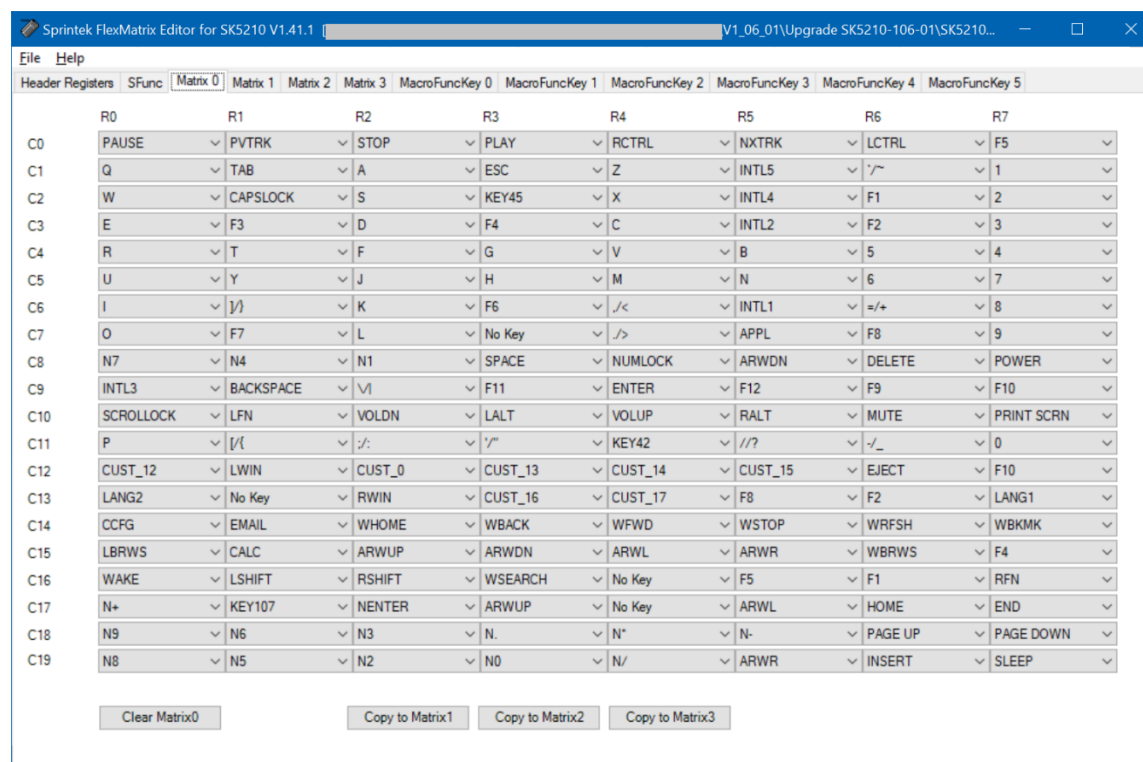
Please refer to Microsoft Windows Platform Design Notes “Keyboard Scan Code Specification” to get more information.

Create Keyboard Matrix

The FlexMatrix Editor program enables the user to create keyboard matrix including macro key definition and function key definition, then save them in binary format.

The Editor program allows the user to assign a logical key to any position in the 8 x 20 matrix. Once a matrix has been created, it is saved in a binary file. The file can be downloaded to the SK5210 flash data block via FlexMatrix Programmer software.

The Editor program can be downloaded from <http://sprintek.com/support/Downloads.aspx>. Here is the screen snapshot of FlexMatrix Editor software.

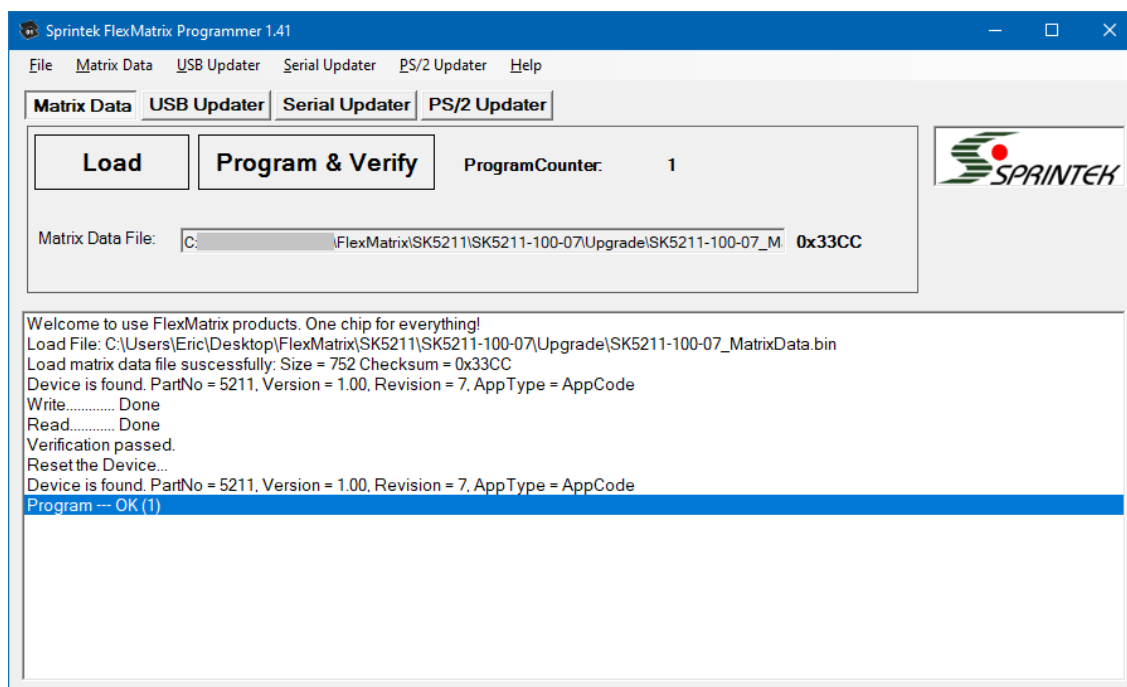


Screen snapshot of FlexMatrix™ Editor

Download Keyboard Matrix

The FlexMatrix Programmer program enables the user to download matrix binary file to the SK5210, upload matrix data from the SK5210's flash data block to a binary file.

The Programmer program can be downloaded from <http://sprintek.com/support/Downloads.aspx>. Here is the screen snapshot of FlexMatrix Programmer software.

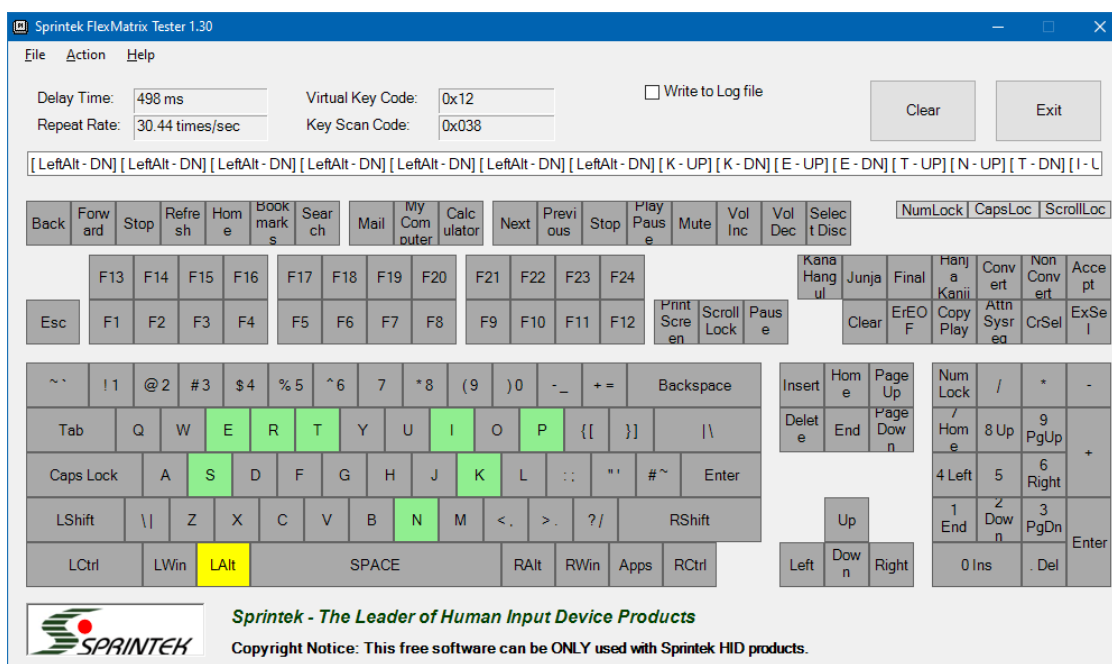


Screen snapshot of FlexMatrix™ Programmer – Matrix Data Upgrade

Test Keyboard Matrix

Sprintek offers a keyboard test tool to verify your keyboard design.

The Tester program can be downloaded from <http://sprintek.com/support/Downloads.aspx>. Here is the screen snapshot of FlexMatrix Programmer software.

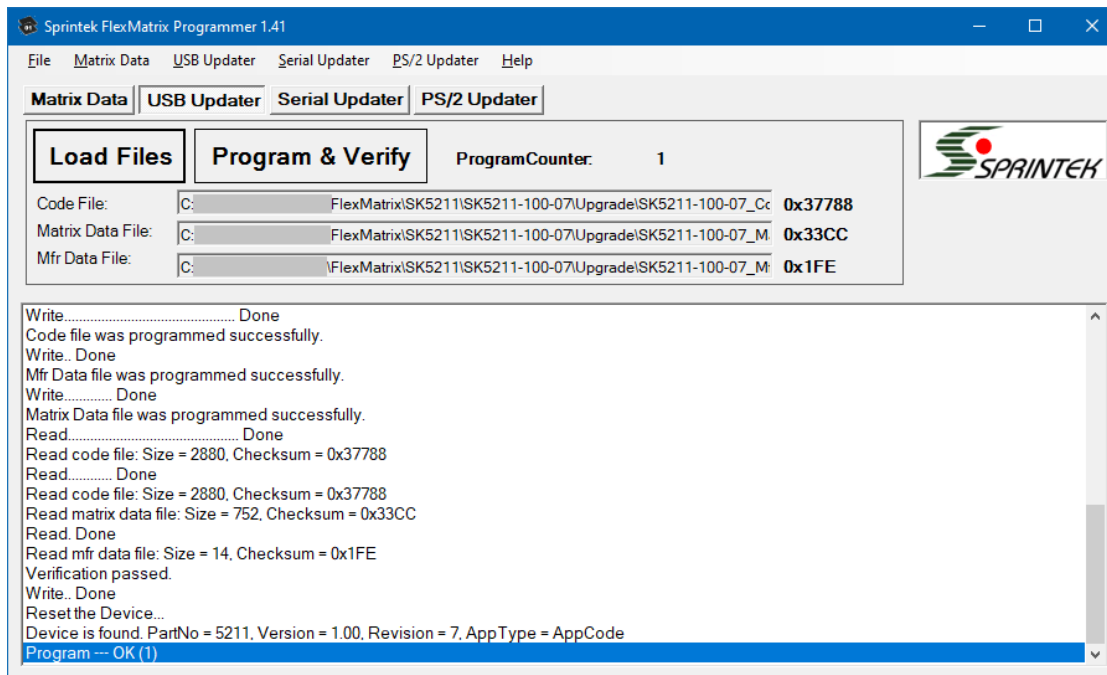


Screen snapshot of FlexMatrix™ Tester

Code Upgrade

The SK5210's bootloader to support field code upgrade. The feature enables users to enjoy new features of your design. 3 files can be upgraded via the FlexMatrix Programmer program: code file, matrix data, manufacturer data.

The Tester program can be downloaded from <http://sprintek.com/support/Downloads.aspx>. Here is the screen snapshot of FlexMatrix Programmer software.



Screen snapshot of FlexMatrix™ Programmer – Code Upgrade

DEFAULT KEYBOARD MATRIX

The following table shows the default keyboard matrix on chip. Please fill out this table and send it to Sprintek for customized design.

Matrix0 and Matrix1(LFn Off)

The following are key matrix0 and matrix1 tables when LFn is off.

Matrix0 – RFn is off and LFn is off;

Matrix1 – RFn is on and LFn is off.

When a single key definition in the table, it will work for RFn off case only. For example, location (C1, R2) “A” will works for matrix 0; but not in matrix1.

When double keys are defined in the table, key in the upper side is for matrix 0 and key in the lower side is for matrix 1. For examples, Location (C12,R7) “F10 / Scroll Lock”, when RFn is off, “F10” is selected; when RFn is on, “Scroll Lock” is selected.

	R0	R1	R2	R3	R4	R5	R6	R7
C0	Pause	PrevTrack	Stop	Play/Pause	Ctrl-R	NextTrack	Ctrl-L	F5
C1	Q	Tab	A	Esc	Z	K131 JP-L	~`	!1
C2	W	Caps Lock	S	K45 UK\	X	K132 JP-M	F1	@2
C3	E	F3	D	F4	C	K133 JP-R	F2	#3
C4	R	T	F	G	V	B	%5	\$4
C5	U	Y	J	H	M	N	^6	&7
C6	I	}]	K	F6	< ,	K56 JP-Ro	+ =	*8
C7	O	F7	L		> .	Apps	F8	(9
C8	N7	N4	N1	Space	Num Lock	↓	Delete	Power
C9	K14 JP-Yen	Back Space	K29 \	F11	Enter	F12	F9	F10
C10	Scroll Lock	LFn / LFn	VolDn	Alt-L	VolUp	Alt-R	Mute	PrtSc
C11	P	{[	::	“”	K42 UK#~	?/	_ -	)0
C12	Shift_F1	Win-L	Backlit Toggle	Shift_F2	Shift_F3	Shift_F4	Eject	F10 / Scroll Lock
C13	K150 KR-L		Win-R	00	000	F8 / KbLock	F2 / F12	K151 KR-R
C14	Media	Email	WHome	WBack	WForward	WStop	WRefresh	WFavorites
C15	My Computer	Calculator	↑ / PgUp	↓ / PgDn	← / Home	→ / End	WExplorer	Shift-R / LFn
C16	Wake Up	Shift-L	Shift-R	WSearch	F4 / Backlit Toggle	F5 / XPs2 Lock	F1 / F11	RFn / RFn
C17	N+	K107 BR	NEnter	↑		←	Home	End
C18	N9	N6	N3	N.	N*	N-	PgUp	PgDn
C19	N8	N5	N2	N0	N/	→	Insert	Sleep

Notes: highlighted cells are RFN impacted keys

Matrix2 and Matrix3 (LFn On)

The following are key matrix2 and matrix3 tables when LFn is on

Matrix2 – RFn is off and LFn is on

Matrix3 – RFn is on and LFn is on

When a single key definition in the table, it will work for RFn off case only. For example, location (C1, R3) “FN_Esc” will work for matrix 2; but not in matrix3.

When double keys are defined in the table, key in the upper side is for matrix 2 and key in the lower side is for matrix 3. For examples, Location (C7,R6) “FN_F8 / KbLock”, when RFn is off, “FN_F8” is selected; when RFn is on, “KbLock” is selected.

	R0	R1	R2	R3	R4	R5	R6	R7
C0								FN_F5
C1				FN_Esc				
C2							FN_F1	
C3		FN_F3		FN_F4			FN_F2	
C4								
C5								
C6				FN_F6				
C7		FN_F7					FN_F8 / KbLock	
C8								
C9				FN_F11		FN_F12	FN_F9	FN_F10
C10		LFn / LFn						
C11								
C12								
C13								
C14								
C15								
C16								RFn / RFn
C17								
C18								
C19								

Notes: highlighted cells are RFn impacted keys

HID USAGE TABLE

Here lists special keys' HID usage code. All other keys are normal keys listed in usage page 7 in document "HID Usage Tables 1.2" from <https://usb.org/>.

Key	Usage Page	Usage
Power	01	81
Sleep	01	82
Wake Up	01	83
NextTrack	0C	B5
PrevTrack	0C	B6
Stop	0C	B7
Eject	0C	B8
Play/Pause	0C	CD
Mute	0C	E2
VolUp	0C	E9
VolDn	0C	EA
Media	0C	183
Email	0C	18A
Calculator	0C	192
My Computer	0C	194
WExplorer	0C	196
WSearch	0C	221
WHome	0C	223
WBack	0C	224
WForward	0C	225
WStop	0C	226
WRefresh	0C	227
WFavorites	0C	22A

Key	Usage Page	Usage
K14	07	89
K29	07	31
K42	07	32
K45	07	64
K56	07	87
K107	07	85
K131	07	8B
K132	07	8A
K133	07	88
K150	07	91
K151	07	90

I2C INTERFACE KEYBOARD REPORT

At default, Fn+Esc, Fn+F1 to Fn+F12 keys are enabled to report to I2C interface. All other keys are disabled for I2C interface. The report format can be seen at "Consumer Key Input Report (HID Page C)" section.

Physical Key	Key Name	USB Key	I2C Key (Page C)
LFn + Esc	FN_Esc	No report	0F00
LFn + F1	FN_F1	No report	0F01
LFn + F2	FN_F2	No report	0F02
LFn + F3	FN_F3	No report	0F03
LFn + F4	FN_F4	No report	0F04
LFn + F5	FN_F5	No report	0F05
LFn + F6	FN_F6	No report	0F06
LFn + F7	FN_F7	No report	0F07
LFn + F8	FN_F8	No report	0F08
LFn + F9	FN_F9	No report	0F09
LFn + F10	FN_F10	No report	0F0A
LFn + F11	FN_F11	No report	0F0B
LFn + F12	FN_F12	No report	0F0C

SCAN CODE TABLE

SKEY is the Sprintek key number.

AT-101 is the key reference number on the standard AT-101 keyboard layout, shown in the diagram below

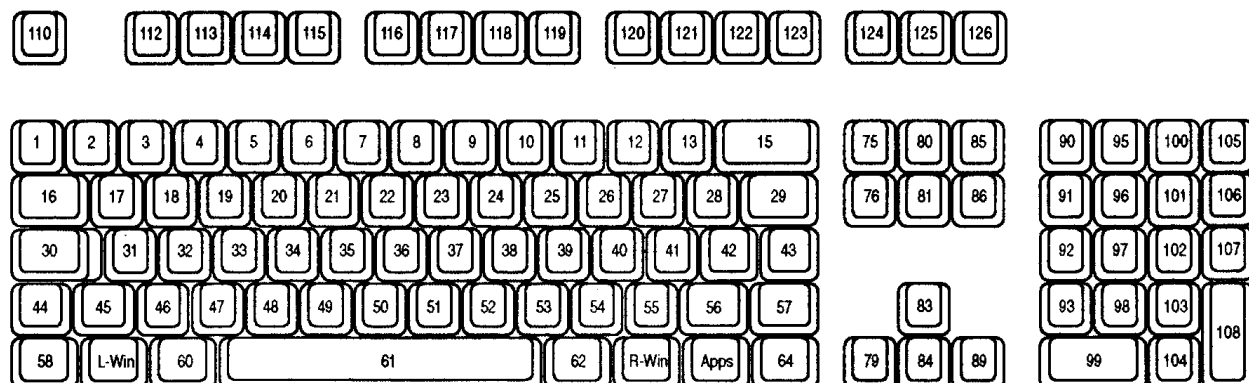
USB page is the Universal Serial Bus (USB) Human Interface Device (HID) usage page for the key. Most keys are on the keyboard page, page 0x07. For information about USB codes, see the USB HID specifications, published by the USB-IF (<http://www.usb.org/>).

USB usage is the USB HID usage ID for the key on the specified USB HID page.

PS/2 codes are the make (key press) and break (key release) codes for PS/2 scan sets 1, 2, and 3; U/A means unassigned. Note that some keys, by default, do not generate break codes, even if the break codes are shown in this table.

Enhanced AT-101 Keyboard Physical Layout

The following figure shows the standard AT-101 keyboard with Windows keys. The numbers on keys are the position number.



SKey and Scan Code Table

SKEY (Dec)	Program Code	Description	AT- 101 (Dec)	USB Page (Hex)	USB Usage (Hex)	Set 1 Make (Hex)	Set 1 Break (Hex)	Set 2 Make (Hex)	Set 2 Break (Hex)	Set 3 Make (Hex)	Set 3 Break (Hex)
0	No Key	No Event	N/A	07	00	None	None	None	None	None	None
1	ROLLOVER	Keyboard Error/Rollover	N/A	07	01	FF	None	00	None	None	None
2	POSTFAIL	Keyboard POST Fail	N/A	07	02	FC	None	FC	None	None	None
3	UNDEFINED	Keyboard Error/Undefined	N/A	07	03	U/A	U/A	U/A	U/A	U/A	U/A
4	A	Keyboard a and A	31	07	04	1E	9E	1C	F0 1C	1C	F0 1C
5	B	Keyboard b and B	50	07	05	30	B0	32	F0 32	32	F0 32
6	C	Keyboard c and C	48	07	06	2E	AE	21	F0 21	21	F0 21
7	D	Keyboard d and D	33	07	07	20	A0	23	F0 23	23	F0 23
8	E	Keyboard e and E	19	07	08	12	92	24	F0 24	24	F0 24
9	F	Keyboard f and F	34	07	09	21	A1	2B	F0 2B	2B	F0 2B
10	G	Keyboard g and G	35	07	0A	22	A2	34	F0 34	34	F0 34
11	H	Keyboard h and H	36	07	0B	23	A3	33	F0 33	33	F0 33
12	I	Keyboard i and I	24	07	0C	17	97	43	F0 43	43	F0 43
13	J	Keyboard j and J	37	07	0D	24	A4	3B	F0 3B	3B	F0 3B
14	K	Keyboard k and K	38	07	0E	25	A5	42	F0 42	42	F0 42
15	L	Keyboard l and L	39	07	0F	26	A6	4B	F0 4B	4B	F0 4B
16	M	Keyboard m and M	52	07	10	32	B2	3A	F0 3A	3A	F0 3A
17	N	Keyboard n and N	51	07	11	31	B1	31	F0 31	31	F0 31
18	O	Keyboard o and O	25	07	12	18	98	44	F0 44	44	F0 44
19	P	Keyboard p and P	26	07	13	19	99	4D	F0 4D	4D	F0 4D
20	Q	Keyboard q and Q	17	07	14	10	90	15	F0 15	15	F0 15
21	R	Keyboard r and R	20	07	15	13	93	2D	F0 2D	2D	F0 2D
22	S	Keyboard s and S	32	07	16	1F	9F	1B	F0 1B	1B	F0 1B
23	T	Keyboard t and T	21	07	17	14	94	2C	F0 2C	2C	F0 2C
24	U	Keyboard u and U	23	07	18	16	96	3C	F0 3C	3C	F0 3C
25	V	Keyboard v and V	49	07	19	2F	AF	2A	F0 2A	2A	F0 2A
26	W	Keyboard w and W	18	07	1A	11	91	1D	F0 1D	1D	F0 1D
27	X	Keyboard x and X	47	07	1B	2D	AD	22	F0 22	22	F0 22
28	Y	Keyboard y and Y	22	07	1C	15	95	35	F0 35	35	F0 35
29	Z	Keyboard z and Z	46	07	1D	2C	AC	1A	F0 1A	1A	F0 1A
30	1	Keyboard 1 and !	2	07	1E	02	82	16	F0 16	16	F0 16
31	2	Keyboard 2 and @	3	07	1F	03	83	1E	F0 1E	1E	F0 1E
32	3	Keyboard 3 and #	4	07	20	04	84	26	F0 26	26	F0 26
33	4	Keyboard 4 and \$	5	07	21	05	85	25	F0 25	25	F0 25
34	5	Keyboard 5 and %	6	07	22	06	86	2E	F0 2E	2E	F0 2E
35	6	Keyboard 6 and ^	7	07	23	07	87	36	F0 36	36	F0 36
36	7	Keyboard 7 and &	8	07	24	08	88	3D	F0 3D	3D	F0 3D

SKKey and Scan Code Table – Continued

SKEY (Dec)	Program Code	Description	AT- 101 (Dec)	USB Page (Hex)	USB Usage (Hex)	Set 1 Make (Hex)	Set 1 Break (Hex)	Set 2 Make (Hex)	Set 2 Break (Hex)	Set 3 Make (Hex)	Set 3 Break (Hex)
37	8	Keyboard 8 and *	9	07	25	09	89	3E	F0.3E	3E	F0.3E
38	9	Keyboard 9 and (	10	07	26	0A	8A	46	F0.46	46	F0.46
39	0	Keyboard 0 and)	11	07	27	0B	8B	45	F0.45	45	F0.45
40	ENTER	Keyboard Return(ENTER)	43	07	28	1C	9C	5A	F0.5A	5A	F0.5A
41	ESC	Keyboard ESCAPE	110	07	29	01	81	76	F0.76	08	F0.08
42	BACKSPACE	Keyboard Backspace	15	07	2A	0E	8E	66	F0.66	66	F0.66
43	TAB	Keyboard Tab	16	07	2B	0F	8F	0D	F0.0D	0D	F0.0D
44	SPACE	Keyboard Spacebar	61	07	2C	39	B9	29	F0.29	29	F0.29
45	- /	Keyboard - and (underscore)	12	07	2D	0C	8C	4E	F0.4E	4E	F0.4E
46	=/+	Keyboard = and +	13	07	2E	0D	8D	55	F0.55	55	F0.55
47	[/{	Keyboard [and {	27	07	2F	1A	9A	54	F0.54	54	F0.54
48	]\}	Keyboard] and }	28	07	30	1B	9B	5B	F0.5B	5B	F0.5B
49	~	Keyboard \ and	29	07	31	2B	AB	5D	F0.5D	5C	F0.5C
50	KEY42	Keyboard Non-US# and ~	42	07	32	2B	AB	5D	F0.5D	5C	F0.5C
51	;	Keyboard ;	40	07	33	27	A7	4C	F0.4C	4C	F0.4C
52	' "	Keyboard ' and "	41	07	34	28	A8	52	F0.52	52	F0.52
53	` ~	Keyboard ` and ~	1	07	35	29	A9	0E	F0.0E	0E	F0.0E
54	, <	Keyboard , and <	53	07	36	33	B3	41	F0.41	41	F0.41
55	. >	Keyboard . and >	54	07	37	34	B4	49	F0.49	49	F0.49
56	/ ?	Keyboard / and ?	55	07	38	35	B5	4A	F0.4A	4A	F0.4A
57	CAPSLOCK	Keyboard CapsLock	30	07	39	3A	BA	58	F0.58	14	F0.14
58	F1	Keyboard F1	112	07	3A	3B	BB	05	F0.05	07	F0.07
59	F2	Keyboard F2	113	07	3B	3C	BC	06	F0.06	0F	F0.0F
60	F3	Keyboard F3	114	07	3C	3D	BD	04	F0.04	17	F0.17
61	F4	Keyboard F4	115	07	3D	3E	BE	0C	F0.0C	1F	F0.1F
62	F5	Keyboard F5	116	07	3E	3F	BF	03	F0.03	27	F0.27
63	F6	Keyboard F6	117	07	3F	40	C0	0B	F0.0B	2F	F0.2F
64	F7	Keyboard F7	118	07	40	41	C1	83	F0.83	37	F0.37
65	F8	Keyboard F8	119	07	41	42	C2	0A	F0.0A	3F	F0.3F
66	F9	Keyboard F9	120	07	42	43	C3	01	F0.01	47	F0.47
67	F10	Keyboard F10	121	07	43	44	C4	09	F0.09	4F	F0.4F
68	F11	Keyboard F11	122	07	44	45	D7	78	F0.78	56	F0.56
69	F12	Keyboard F12	123	07	45	46	D8	07	F0.07	5E	F0.5E
70	PRINT SCRN	Keyboard PrintScreen	124	07	46	E0.37	E0.B7	E0.7C	E0.F0.7C	57	F0.57
71	SCROLLLOCK	Keyboard ScrollLock	125	07	47	46	C6	7E	F0.7E	5F	F0.5F
72	PAUSE	Keyboard Pause	126	07	48	E1.1D.45 E19D.C5	None	E1.14.77 E1.F0.14 E0.77	None	62	F0.62

SKey and Scan Code Table – Continued

SKEY (Dec)	Program Code	Description	AT- 101 (Dec)	USB Page (Hex)	USB Usage (Hex)	Set 1 Make (Hex)	Set 1 Break (Hex)	Set 2 Make (Hex)	Set 2 Break (Hex)	Set 3 Make (Hex)	Set 3 Break (Hex)
72	PULSE	Keyboard Break (Ctrl+Pause)	126	07	48	E0 46 E0 C6	None	E0 7E E0 F0 7E	None	62	F0 62
73	INSERT	Keyboard Insert	75	07	49	E0 52	E0 D2	E0 70	E0 F0 70	67	F0 67
74	HOME	Keyboard Home	80	07	4A	E0 47	E0 C7	E0 6C	E0 F0 6C	6E	F0 6E
75	PAGE UP	Keyboard PageUp	85	07	4B	E0 49	E0 C9	E0 7D	E0 F0 7D	6F	F0 6F
76	DELETE	Keyboard Delete Forward	76	07	4C	E0 53	E0 D3	E0 71	E0 F0 71	64	F0 64
77	END	Keyboard End	81	07	4D	E0 4F	E0 CF	E0 69	E0 F0 69	65	F0 65
78	PAGE DOWN	Keyboard PageDown	86	07	4E	E0 51	E0 D1	E0 7A	E0 F0 7A	6D	F0 6D
79	ARWR	Keyboard RightArrow	89	07	4F	E0 4D	E0 CD	E0 74	E0 F0 74	6A	F0 6A
80	ARWL	Keyboard LeftArrow	79	07	50	E0 4B	E0 CB	E0 6B	E0 F0 6B	61	F0 61
81	ARWDN	Keyboard DownArrow	84	07	51	E0 50	E0 D0	E0 72	E0 F0 72	60	F0 60
82	ARWUP	Keyboard UpArrow	83	07	52	E0 48	E0 C8	E0 75	E0 F0 75	63	F0 63
83	NUMLOCK	Keypad NumLock	90	07	53	45	C5	77	F0 77	76	F0 76
84	N/	Keypad /	95	07	54	E0 35	E0 B5	E0 4A	E0 F0 4A	77	F0 77
85	N*	Keypad *	100	07	55	37	B7	7C	F0 7C	7E	F0 7E
86	N-	Keypad -	105	07	56	4A	CA	7B	F0 7B	84	F0 84
87	N+	Keypad +	106	07	57	4E	CE	79	F0 79	7C	F0 7C
88	NENTER	Keypad ENTER	108	07	58	E0 1C	E0 9C	E0 5A	E0 F0 5A	79	F0 79
89	N1	Keypad 1 and End	93	07	59	4F	CF	69	F0 69	69	F0 69
90	N2	Keypad 2 and Down Arrow	98	07	5A	50	D0	72	F0 72	72	F0 72
91	N3	Keypad 3 and PageDn	103	07	5B	51	D1	7A	F0 7A	7A	F0 7A
92	N4	Keypad 4 and Left Arrow	92	07	5C	4B	CB	6B	F0 6B	6B	F0 6B
93	N5	Keypad 5	97	07	5D	4C	CC	73	F0 73	73	F0 73
94	N6	Keypad 6 and Right Arrow	102	07	5E	4D	CD	74	F0 74	74	F0 74
95	N7	Keypad 7 and Home	91	07	5F	47	C7	6C	F0 6C	6C	F0 6C
96	N8	Keypad 8 and Up Arrow	96	07	60	48	C8	75	F0 75	75	F0 75
97	N9	Keypad 9 and PageUp	101	07	61	49	C9	7D	F0 7D	7D	F0 7D
98	N0	Keypad 0 and Insert	99	07	62	52	D2	70	F0 70	70	F0 70
99	N.	Keypad . and Delete	104	07	63	53	D3	71	F0 71	71	F0 71
100	KEY45	Keypad Non-US \ and	45	07	64	56	D6	61	F0 61	61	F0 61
101	APPL	Keyboard Application	129	07	65	E0 5D	E0 DD	E0 2F	E0 F0 2F	8D	F0 8D
102	POWER	Keyboard Power	U/A	07	66	E0 5E	E0 DE	E0 37	E0 F0 37	U/A	U/A
103	N=	Keypad =	U/A	07	67	59	D9	0F	F0 0F	U/A	U/A
104	F13	Keypad F13	U/A	07	68	64	E4	08	F0 08	08	F0 08
105	F14	Keypad F14	U/A	07	69	65	E5	10	F0 10	10	F0 10
106	F15	Keypad F15	U/A	07	6A	66	E6	18	F0 18	18	F0 18
107	F16	Keypad F16	U/A	07	6B	67	E7	20	F0 20	20	F0 20

SKey and Scan Code Table – Continued

SKEY (Dec)	Program Code	Description	AT- 101 (Dec)	USB Page (Hex)	USB Usage (Hex)	Set 1 Make (Hex)	Set 1 Break (Hex)	Set 2 Make (Hex)	Set 2 Break (Hex)	Set 3 Make (Hex)	Set 3 Break (Hex)
108	F17	Keyboard F17	U/A	07	6C	68	E8	28	F0 28	28	F0 28
109	F18	Keyboard F18	U/A	07	6D	69	E9	30	F0 30	30	F0 30
110	F19	Keyboard F19	U/A	07	6E	6A	EA	38	F0 38	38	F0 38
111	F20	Keyboard F20	U/A	07	6F	6B	EB	40	F0 40	40	F0 40
112	F21	Keyboard F21	U/A	07	70	6C	EC	48	F0 48	48	F0 48
113	F22	Keyboard F22	U/A	07	71	6D	ED	50	F0 50	50	F0 50
114	F23	Keyboard F23	U/A	07	72	6E	EE	57	F0 57	57	F0 57
115	F24	Keyboard F24	U/A	07	73	76	F6	5F	F0 5F	5F	F0 5F
116	CTRL	Keyboard LeftControl	58	07	F0	1D	9D	14	F0 14	11	F0 11
117	SHIFT	Keyboard LeftShift	44	07	F1	2A	AA	12	F0 12	12	F0 12
118	ALT	Keyboard LeftAlt	60	07	F2	38	B8	11	F0 11	39	F0 39
119	LWIN	Keyboard Left GUI	127	07	F3	E0 5B	E0 DB	E0 1F	E0 F0 1F	8B	F0 8B
120	RCTRL	Keyboard RightControl	64	07	F4	E0 1D	E0 9D	E0 14	E0 F0 14	58	F0 58
121	RSHIFT	Keyboard RightShift	57	07	F5	36	B6	59	F0 59	59	F0 59
122	RALT	Keyboard RightAlt	62	07	F6	E0 38	E0 B8	E0 11	E0 F0 11	39	F0 39
123	RWIN	Keyboard Right GUI	128	07	F7	E0 5C	E0 DC	E0 27	E0 F0 27	8C	F0 8C
124	SK124	Reserved	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
125	SK125	Reserved	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
126	SK126	Reserved	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
127	SK127	Reserved	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
128	SK128	Reserved	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
129	SK129	Reserved	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
130	SK130	Reserved	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
131	SK131	Reserved	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
132	SK132	Reserved	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
133	KEY107	Keypad , (Brazilian Keypad .)	107	07	85	7E	FE	6D	F0 6D	7B	F0 7B
134	KEY=	Keypad Equal Sign	U/A	07	86	U/A	U/A	U/A	U/A	U/A	U/A
135	INTL1	Keypad Int'l 1 (Ro)	56	07	87	73	F3	51	F0 51	51	F0 51
136	INTL2	Keypad Int'l 2 (Katakana/Hiragana)	133	07	88	70	F0	13	F0 13	87	F0 87
137	INTL3	Keypad Int'l 3 (Yen)	14	07	89	7D	FD	6A	F0 6A	5D	F0 5D
138	INTL4	Keypad Int'l 4 (Henkan)	132	07	8A	79	F9	64	F0 64	86	F0 86
139	INTL5	Keypad Int'l 5 (Muhenkan)	131	07	8B	7B	FB	67	F0 67	85	F0 85
140	INTL6	Keypad Int'l 6 (PC9800 Keypad .)	U/A	07	8C	5C	DC	27	F0 27	U/A	U/A
141	INTL7	Keypad Int'l 7	U/A	07	8D	U/A	U/A	U/A	U/A	U/A	U/A
142	INTL8	Keypad Int'l 8	U/A	07	8E	U/A	U/A	U/A	U/A	U/A	U/A

SKey and Scan Code Table – Continued

SKEY (Dec)	Program Code	Description	AT- 101 (Dec)	USB Page (Hex)	USB Usage (Hex)	Set 1 Make (Hex)	Set 1 Break (Hex)	Set 2 Make (Hex)	Set 2 Break (Hex)	Set 3 Make (Hex)	Set 3 Break (Hex)
143	INTL9	Keyboard Int'l 9	U/A	07	8F	U/A	U/A	U/A	U/A	U/A	U/A
144	LANG1	Keyboard LANG 1 (Hangeul/English)	U/A	07	90	F2	None	F2	None	U/A	U/A
145	LANG2	Keyboard LANG 2 (Hania)	U/A	07	91	F1	None	F1	None	U/A	U/A
146	LANG3	Keyboard LANG 3 (Katakana)	U/A	07	92	78	F8	63	F0 63	U/A	U/A
147	LANG4	Keyboard LANG 4 (Hiragana)	U/A	07	93	77	F7	62	F0 62	U/A	U/A
148	LANG5	Keyboard LANG 5 (Zenkaku/Hankaku)	U/A	07	94	76	F6	5F	F0 5F	U/A	U/A
149	LANG6	Keyboard LANG 6	U/A	07	95	U/A	U/A	U/A	U/A	U/A	U/A
150	LANG7	Keyboard LANG 7	U/A	07	96	U/A	U/A	U/A	U/A	U/A	U/A
151	LANG8	Keyboard LANG 8	U/A	07	97	U/A	U/A	U/A	U/A	U/A	U/A
152	LANG9	Keyboard LANG 9	U/A	07	98	U/A	U/A	U/A	U/A	U/A	U/A
153	PWR	System Power	U/A	01	81	E0 5E	E0 DE	E0 37	E0 F0 37	U/A	U/A
154	SLEEP	System Sleep	U/A	01	82	E0 5F	E0 DE	E0 3F	E0 F0 3F	U/A	U/A
155	WAKE	System Wake Up	U/A	01	83	E0 63	E0 E3	E0 5E	E0 F0 5E	U/A	U/A
156	SK156	Reserved	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
157	SK157	Reserved	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
158	LFN	Left FN	U/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
159	REN	Right FN	U/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
160	HELP	Help	U/A	0C	0095	U/A	U/A	U/A	U/A	U/A	U/A
161	NXTRK	Scan Next Track	U/A	0C	00B5	E0 19	F0 99	E0 4D	E0 F0 4D	U/A	U/A
162	PVTRK	Scan Previous Track	U/A	0C	00B6	E0 10	F0 90	E0 15	E0 F0 15	U/A	U/A
163	STOP	Stop	U/A	0C	00B7	E0 24	F0 A4	E0 3B	E0 F0 3B	U/A	U/A
164	PLAY	Play/Pause	U/A	0C	00CD	E0 22	F0 A2	E0 34	E0 F0 34	U/A	U/A
165	VOL	Volume	U/A	0C	00E0	U/A	U/A	U/A	U/A	U/A	U/A
166	MUTE	AC Mute	U/A	0C	00E2	E0 20	F0 A0	E0 23	E0 F0 23	U/A	U/A
167	BASS	Bass	U/A	0C	00E3	U/A	U/A	U/A	U/A	U/A	U/A
168	THREBLE	Treble	U/A	0C	00E4	U/A	U/A	U/A	U/A	U/A	U/A
169	BASSBOOST	Bass Boost	U/A	0C	00E5	U/A	U/A	U/A	U/A	U/A	U/A
170	LOUDNESS	Loudness	U/A	0C	00E7	U/A	U/A	U/A	U/A	U/A	U/A
171	VOLDN	Volume Up	U/A	0C	00E9	E0 30	30 B0	E0 32	E0 F0 32	U/A	U/A
172	VOLUP	Volume Down	U/A	0C	00EA	E0 2E	F0 AE	E0 21	E0 F0 21	U/A	U/A
173	BASSUP	Bass Up	U/A	0C	0152	U/A	U/A	U/A	U/A	U/A	U/A

SKey and Scan Code Table – Continued

SKEY (Dec)	Program Code	Description	AT- 101 (Dec)	USB Page (Hex)	USB Usage (Hex)	Set 1 Make (Hex)	Set 1 Break (Hex)	Set 2 Make (Hex)	Set 2 Break (Hex)	Set 3 Make (Hex)	Set 3 Break (Hex)
174	BASSDN	Bass Down	U/A	0C	0153	U/A	U/A	U/A	U/A	U/A	U/A
175	TREBUP	Treble Up	U/A	0C	0154	U/A	U/A	U/A	U/A	U/A	U/A
176	TREBDN	Treble Down	U/A	0C	0155	U/A	U/A	U/A	U/A	U/A	U/A
177	CCEG	AL Consumer Control Config	U/A	0C	0183	E0 6D	E0 ED	E0 50	E0 F0 50	U/A	U/A
178	WORD	AL Word Processor	U/A	0C	0184	U/A	U/A	U/A	U/A	U/A	U/A
179	SPRD	AL Spreadsheet	U/A	0C	0186	U/A	U/A	U/A	U/A	U/A	U/A
180	EMAIL	AL Email Reader	U/A	0C	018A	E0 6C	E0 EC	E0 48	E0 F0 48	U/A	U/A
181	CALND	AL Calendar	U/A	0C	018E	U/A	U/A	U/A	U/A	U/A	U/A
182	CALC	AL Calculator	U/A	0C	0192	E0 21	E0 A1	E0 2B	E0 F0 2B	U/A	U/A
183	AV	AL AV Capature	U/A	0C	0193	U/A	U/A	U/A	U/A	U/A	U/A
184	LBRWS	AL Local Machine Browser	U/A	0C	0194	E0 6B	E0 EB	E0 40	E0 F0 40	U/A	U/A
185	WBRWS	AL Internet Browser	U/A	0C	0196	U/A	U/A	U/A	U/A	U/A	U/A
186	CHAT	AL Network Chat	U/A	0C	0199	U/A	U/A	U/A	U/A	U/A	U/A
187	LGOFF	AL Logoff	U/A	0C	019C	U/A	U/A	U/A	U/A	U/A	U/A
188	NXAPP	AL Next Task	U/A	0C	01A3	U/A	U/A	U/A	U/A	U/A	U/A
189	PVAPP	AL Previous Task	U/A	0C	01A4	U/A	U/A	U/A	U/A	U/A	U/A
190	SPELL	AL Spell Check	U/A	0C	01AB	U/A	U/A	U/A	U/A	U/A	U/A
191	FBRWS	AL File Browser	U/A	0C	01B4	U/A	U/A	U/A	U/A	U/A	U/A
192	NEW	AC New	U/A	0C	0201	U/A	U/A	U/A	U/A	U/A	U/A
193	OPEN	AC Open	U/A	0C	0202	U/A	U/A	U/A	U/A	U/A	U/A
194	CLOSE	AC Close	U/A	0C	0203	U/A	U/A	U/A	U/A	U/A	U/A
195	SAVE	AC Save	U/A	0C	0207	U/A	U/A	U/A	U/A	U/A	U/A
196	PRINT	AC Print	U/A	0C	0208	U/A	U/A	U/A	U/A	U/A	U/A
197	UNDO	AC Undo	U/A	0C	021A	U/A	U/A	U/A	U/A	U/A	U/A
198	COPY	AC Copy	U/A	0C	021B	U/A	U/A	U/A	U/A	U/A	U/A
199	CUT	AC Cute	U/A	0C	021C	U/A	U/A	U/A	U/A	U/A	U/A
200	PASTE	AC Paste	U/A	0C	021D	U/A	U/A	U/A	U/A	U/A	U/A
201	WSEARCH	AC Search	U/A	0C	0221	E0 65	E0 E5	E0 10	E0 F0 10	U/A	U/A
202	WHOME	AC Home	U/A	0C	0223	E0 32	E0 B2	E0 3A	E0 F0 3A	U/A	U/A
203	WBACK	AC Back	U/A	0C	0224	E0 6A	E0 EA	E0 38	E0 F0 38	U/A	U/A
204	WFWD	AC Forward	U/A	0C	0225	E0 69	E0 E9	E0 30	E0 F0 30	U/A	U/A
205	WSTOP	AC Stop	U/A	0C	0226	E0 68	E0 E8	E0 28	E0 F0 28	U/A	U/A
206	WREFSH	AC Refresh	U/A	0C	0227	E0 67	E0 E7	E0 20	E0 F0 20	U/A	U/A
207	WBKMK	AC Bookmarks	U/A	0C	022A	E0 66	E0 E6	E0 18	E0 F0 18	U/A	U/A
208	REDO	AC Redo/Repeat	U/A	0C	0279	U/A	U/A	U/A	U/A	U/A	U/A
209	REPLY	AC Reply	U/A	0C	0289	U/A	U/A	U/A	U/A	U/A	U/A

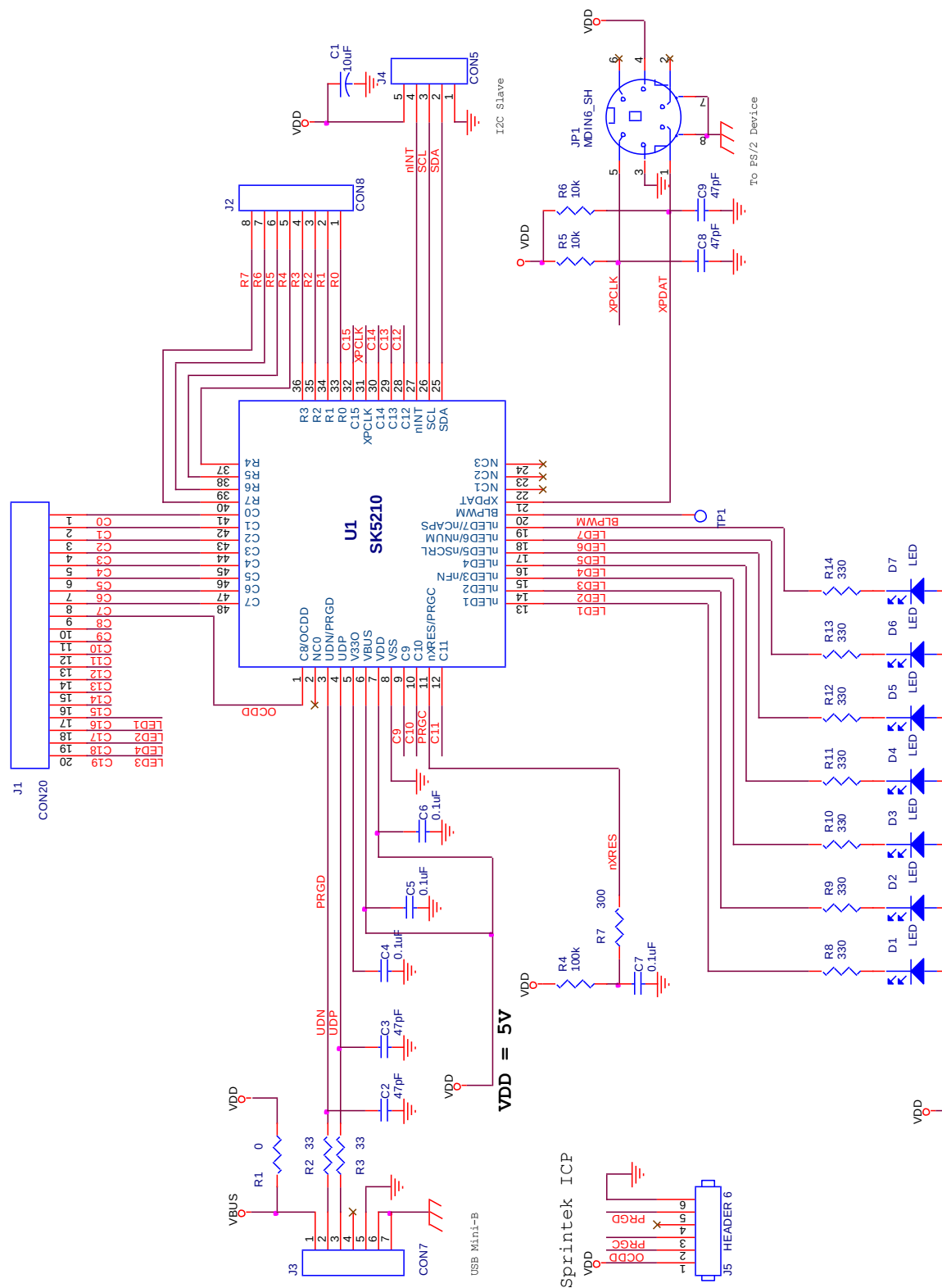
SKey and Scan Code Table – Continued

SKEY (Dec)	Program Code	Description	AT- 101 (Dec)	USB Page (Hex)	USB Usage (Hex)	Set 1 Make (Hex)	Set 1 Break (Hex)	Set 2 Make (Hex)	Set 2 Break (Hex)	Set 3 Make (Hex)	Set 3 Break (Hex)
210	MSFWD	AC Forward Message	U/A	0C	028B	U/A	U/A	U/A	U/A	U/A	U/A
211	SEND	AC Send Message	U/A	0C	028C	U/A	U/A	U/A	U/A	U/A	U/A
212	OFFICE	Office	U/A	0C	029D	U/A	U/A	U/A	U/A	U/A	U/A
213	TASK	Task Panel	U/A	0C	029E	U/A	U/A	U/A	U/A	U/A	U/A
214	CUST 0	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
215	CUST 1	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
216	CUST 2	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
217	CUST 3	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
218	CUST 4	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
219	CUST 5	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
220	CUST 6	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
221	CUST 7	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
222	CUST 8	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
223	CUST 9	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
224	CUST 10	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
225	CUST 11	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
226	CUST 12	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
227	CUST 13	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
228	CUST 14	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
229	CUST 15	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
230	CUST 16	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
231	CUST 17	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
232	CUST 18	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
233	CUST 19	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
234	CUST 20	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
235	CUST 21	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
236	CUST 22	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
237	CUST 23	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
238	CUST 24	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
239	CUST 25	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
240	CUST 26	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
241	CUST 27	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
242	CUST 28	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
243	CUST 29	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
244	CUST 30	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
245	CUST 31	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A

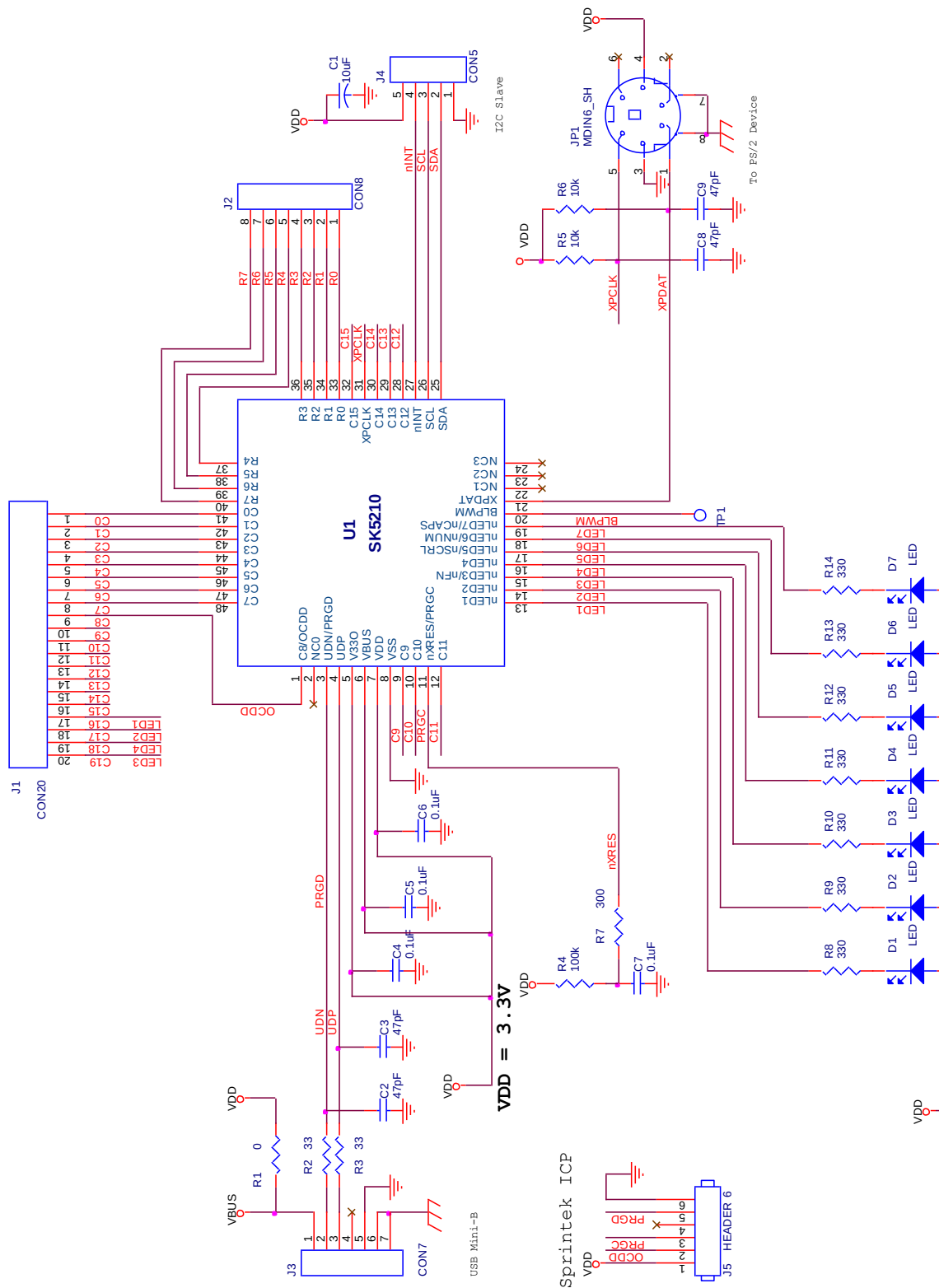
SKey and Scan Code Table – Continued

SKEY (Dec)	Program Code	Description	AT- 101 (Dec)	USB Page (Hex)	USB Usage (Hex)	Set 1 Make (Hex)	Set 1 Break (Hex)	Set 2 Make (Hex)	Set 2 Break (Hex)	Set 3 Make (Hex)	Set 3 Break (Hex)
246	CUST_32	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
247	CUST_33	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
248	CUST_34	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
249	CUST_35	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
250	CUST_36	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
251	CUST_37	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
252	CUST_38	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
253	CUST_39	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
254	CUST_40	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A
255	CUST_41	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A	U/A

SCHEMATIC OF REFERENCE DESIGN (5V)



SCHEMATIC OF REFERENCE DESIGN (3.3V)



ELECTRONICS SPECIFICATION

Absolute Maximum Ratings

Symbol	Description	Min	Typ	Max	Units	Notes
TSTG	Storage Temperature	-50	25	+125	°C	
VDD	Supply Voltage on Relative to VSS	-0.3	-	+6.0	V	
VIO	DC Input Voltage	VSS-0.3	-	VDD+0.3	V	
IMTO	Maximum Current into all pins in total	-100	-	+150	mA	

Operating Temperature

Symbol	Description	Min	Typ	Max	Units	Notes
TOP	Operating Temperature	-40	-	+85	°C	

DC Electrical Characteristics

Symbol	Description	Min	Typ	Max	Units	Notes
VDD	Supply Voltage at USB regulator enabled interface	3.0	-	5.5	V	When USB is connected, 3.3V or 5V are required
IDD-U33	Supply Current when IC is in USB operation mode		5.5		mA	
IDD-U50	Supply Current when IC is in USB operation mode		11		mA	
ISD-USB	Supply Current when IC is in USB suspend mode		240		uA	
ISD-I2C	Supply Current when IC is in I2C mode only and no key is pressed		0.3		uA	
RPU	Pull-up Resistor	10	30	50	kΩ	5V
		20	60	100	kΩ	3.3V

GPIO Electrical Characteristics

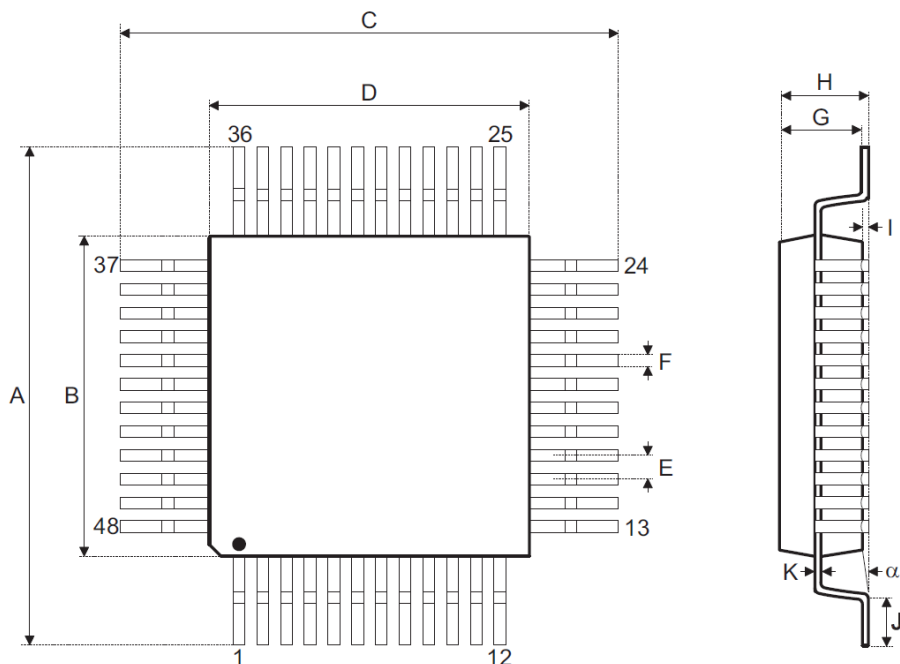
Symbol	Description	Min	Typ	Max	Units	Notes
VIL	Input Low Level	-	-	0.2VDD	V	
VIH	Input High Level	0.8VDD	-	-	V	

I2C Slave Electrical Characteristics

Symbol	Description	Min	Typ	Max	Units	Notes
BI2C	I2C baud rate	-	-	400k	Hz	

PACKAGING INFORMATION

SK5210 Drawing



Symbol	Dimensions in mm		
	Min.	Nom.	Max.
A	-	9.00BSC	-
B	-	7.00BSC	-
C	-	9.00BSC	-
D	-	7.00BSC	-
E	-	0.50BSC	-
F	0.17	0.22	0.27
G	1.35	1.40	1.45
H	-	-	1.60
I	0.05	-	0.15
J	0.45	0.60	0.75
K	0.09	-	0.20
α	0°	-	7°

SK5210 48-pin (7x7mm 1.6 MAX) LQFP

SALE AND SERVICE INFORMATION

To obtain information about Sprintek Corporation or FlexMatrix keyboard controller family sales and technical support, reference the following information.

Sprintek Corporation

4969 Corral St.

Simi Valley, CA 93063, USA

Web Site: <http://www.sprintek.com>

REVISION HISTORY

Revision	Issue Date	Description
1.00	January 31, 2019	Initial release
1.01	October 28, 2021	Updated default matrix tables for v1.06 version firmware