

**SK5221** FlexMatrix™ 8x20 Keyboard Controller**Sprintek Corporation**

Ultra-Low Power HID over I2C Keyboard Controller

with 1 external PS/2, 1 PWM Backlight and 9 LEDs Control, Field-Upgradable Bootloader

**FEATURES**

- HID over I2C v1.0 interface with Bootloader for field upgrade
- One external PS/2 interface to PS/2 device such as mouse, touchpad, pointing stick, keyboard
- 9 LEDs (4 shared with column scan pins)
- 1 PWM backlight brightness control
- FN key support
- 8 x 20 matrix keyboard scan
- Advanced ghost key detection algorithm to maximize the key combination without additional diodes
- User-Programmable keyboard matrix
- 4 Matrix Tables for LFn, RFn cases, NumLock On/Off cases
- Support macro keys to generate like "Ctrl+Alt+Del", or "Coke Cola", "000" sequential string outputs
- PS/2 command relay support
- HID over I2C interface supports 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: 0.3uA (no key pressed)
- Operation voltage range: 2.7 to 5.5V
- Industrial temperature range: -40°C to +85°C
- Custom versions available in small and large quantities

**APPLICATION**

- Notebook PCs
- Tablet PCs
- Tablet/Mobile Phone docking station
- Instruments
- PS/2 to I2C protocol converter

**ORDEING INFORMATION**

**SK5221** LQFP 48-pin, 0.5mm pitch, (7x7mm 1.6 MAX), Pb-Free, RoHS Complaint

**DESCRIPTION**

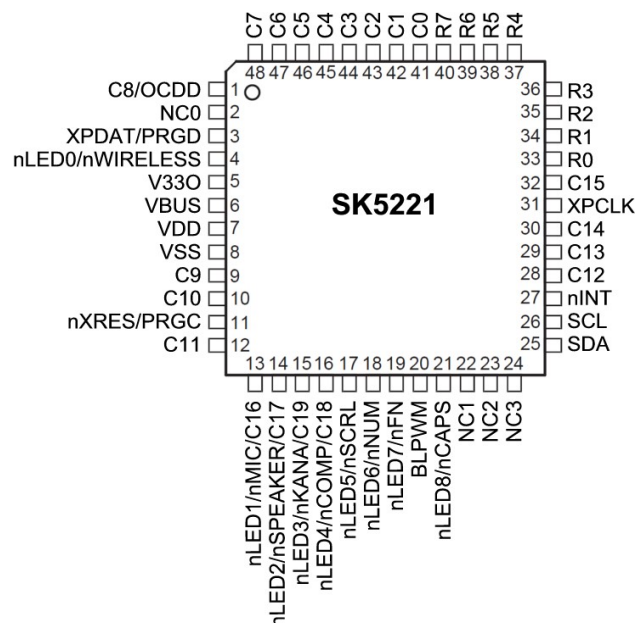
The SK5221 is an ultra-low power (0.3uA) HID over I2C interface keyboard encoder with 1 PWM backlight and 9 LEDs control. It's the best choice for customized keyboard design for battery powered tablet / laptop / docking station / Instrument.

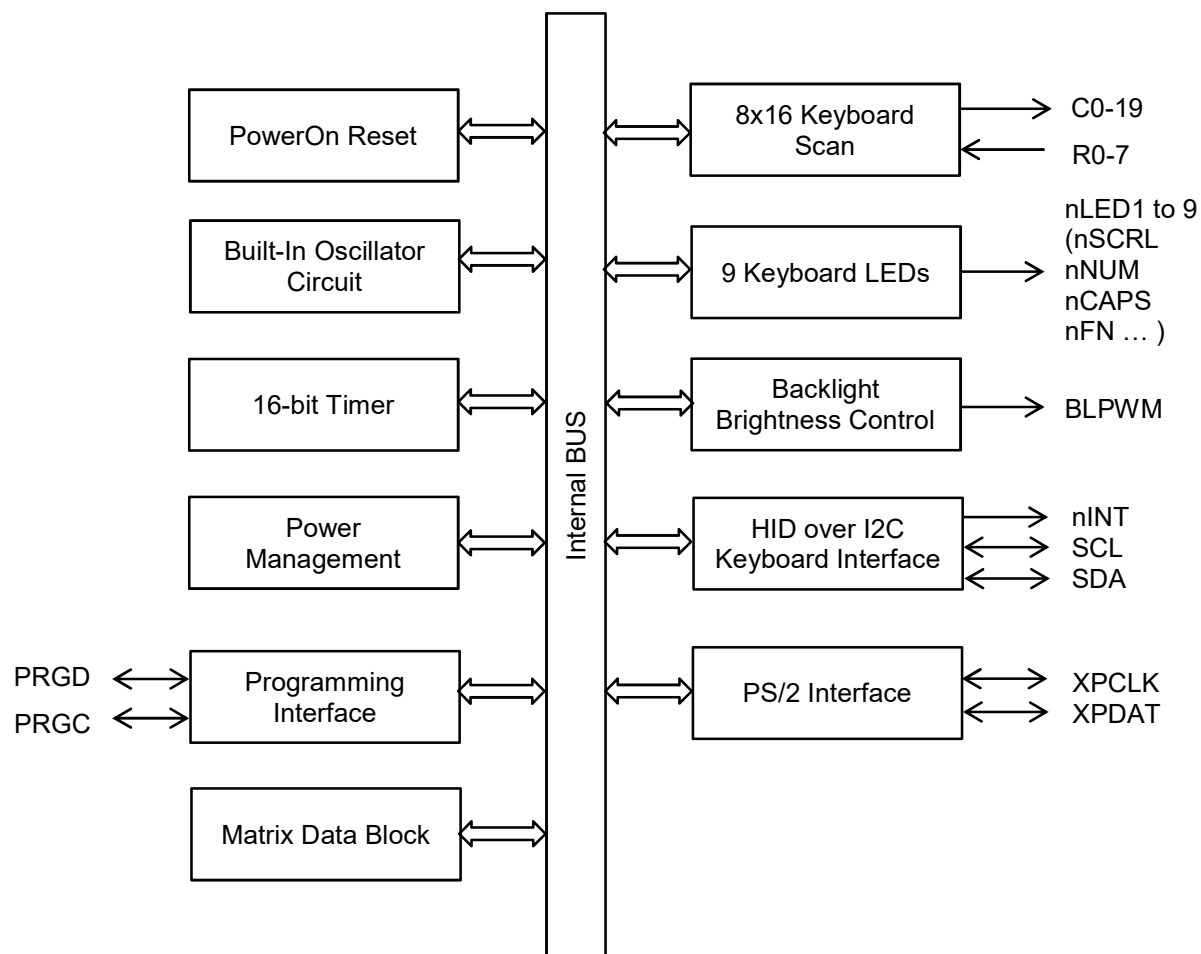
The SK5221 scans and encodes an 8-row by 20-column matrix. The key press events are translated to keyboard report. The encoder gets matrix information from on-chip matrix tables.

4 LED pins and 4 column pins are shared pins to meet different applications' needs.

The SK5221 provides one key-controlled and command-controlled PWM for backlight LED PWM brightness control.

The SK5221 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 SK5221 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   | XPDAT/PRGD                   | External PS/2 data line / programming data line                 |
| 4       | O    | nLED0 /<br>nWIRELESS         | General LED0 / Wireless LED                                     |
| 5       | P    | V330                         | Reserved                                                        |
| 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 / nMIC /<br>C16        | General LED1 / Microphone Mute LED / Column line 16             |
| 14      | O    | nLED2 /<br>nSPEAKER /<br>C17 | General LED2 / Speaker Mute LED / Column line 17                |
| 15      | O    | nLED3 / nKANA /<br>C19       | General LED3 / Kana LED / Column line 19                        |
| 16      | O    | nLED4 / nCOMP<br>/ C18       | General LED4 / Compose LED / Column line 18                     |
| 17      | O    | nLED5 / nSCRL                | General LED5 / Scroll lock LED                                  |
| 18      | O    | nLED6 / nNUM                 | General LED6 / Num lock LED                                     |
| 19      | O    | nLED7 / nFN                  | General LED7 / Fn lock LED                                      |
| 20      | O    | BLPWM                        | Backlight control PWM                                           |
| 21      | O    | nLED8 / nCAPS                | General LED8 / Caps lock LED                                    |
| 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 SK5221 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, HID over I2C keyboard interface, external PS/2 interface. All sections communicate with each other and operate concurrently.

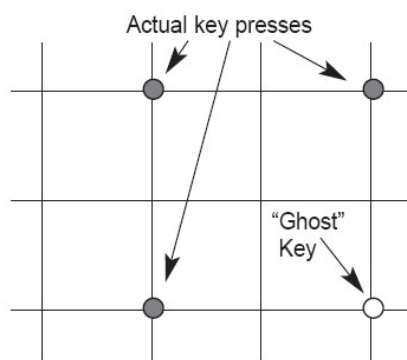
### Keyboard Scan

The SK5221 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 de-bounced 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 SK5221 has built-in mechanisms to detect and reject “ghost” keys.



### Keyboard LEDs

The SK5221 provides 9 pins to directly drive LEDs for CapsLock, Numlock, Scrolllock, Fnlock, Compose, Kana, Speaker Mute, Microphone Mute and Wireless functions. They can be also used as general LED indicators except Fnlock LED. Fnlock LED (LED7) is controlled by SK5221 automatically.

The LED1 to LED4 pins and C16 to C19 share the physical pins. The function can be switched by the KbScan\_IoConfig byte defined in Matrix Data Block.

| Pin No | Type | Name        | Description                    |
|--------|------|-------------|--------------------------------|
| 13     | O    | nLED1 / C16 | General LED1 or Column line 16 |
| 14     | O    | nLED2 / C17 | General LED2 or Column line 17 |
| 15     | O    | nLED3 / C19 | General LED3 or Column line 19 |
| 16     | O    | nLED4 / C18 | General LED4 or Column line 18 |

### HID over I2C Interface

The SK5221 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 (default) or high assertion.

### Power Management

The SK5221 automatically enter low power mode when no key is pressed. The SK5221 also support SET\_POWER command to disable / enable keyboard scan.

## 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 SK5221 has built-in power on reset circuit with simple external RC components.

## Oscillator Circuit

The SK5221 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 I2C communication, keyboard scan and sleep timer wakeup.

## External PS/2 Port

The SK5221 provides an external PS/2 port that supports hot plug and hot swap of PS/2 devices including touchpad, pointing stick mouse, and keyboards. The host can send any PS/2 commands to control the external PS/2 device settings via the SK5221's PS/2 command relay feature.

## Matrix Data Block

The SK5221 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

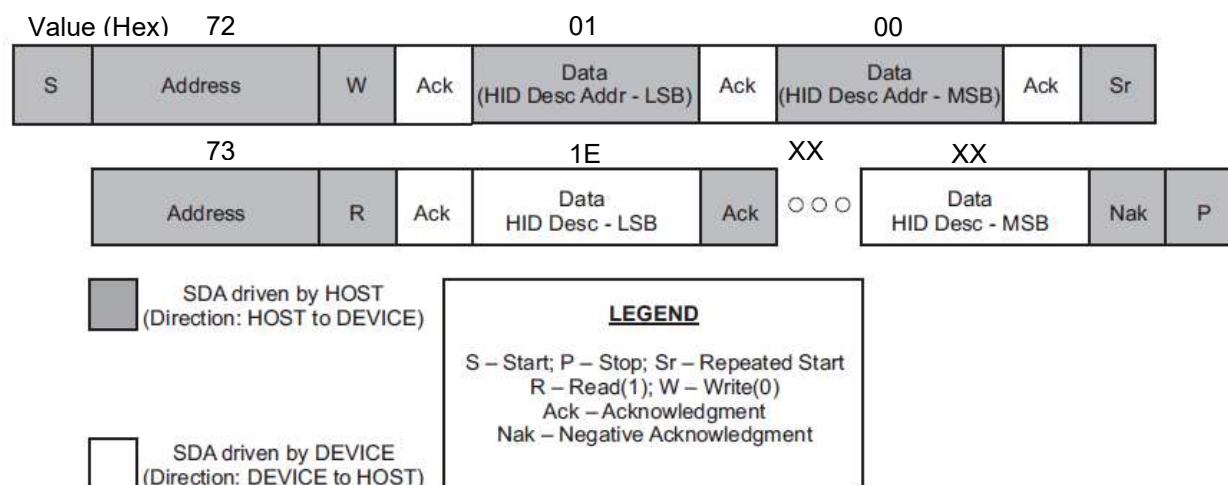
The 7-bit address of the device is shown as below 0x39. After combined with R/W bit, the 8-bit address is 0x72 for I2C write operation, 0x73 for I2C read operation.

### 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

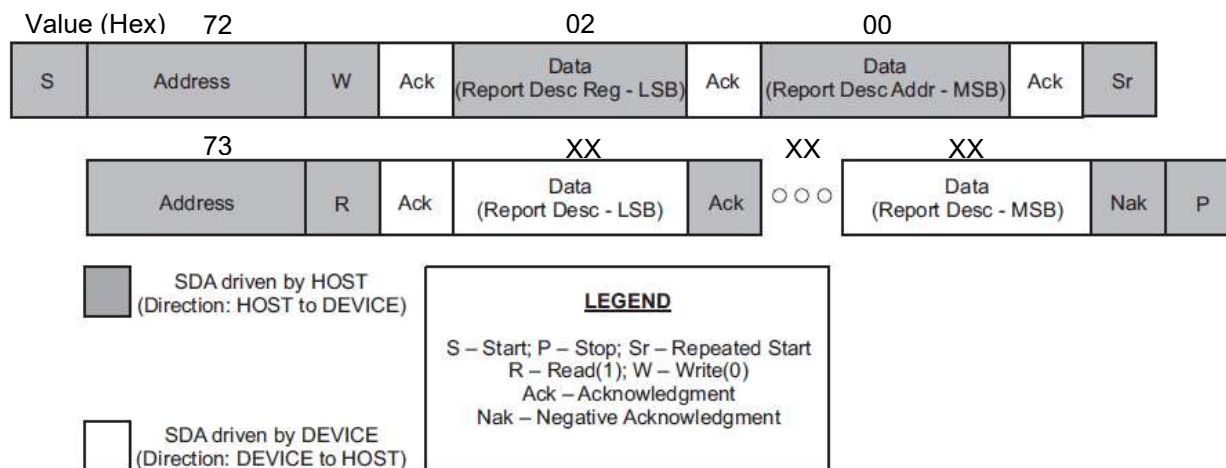
| Register Address | Register Definition | R/W        | Data Byte | Notes                                                               |
|------------------|---------------------|------------|-----------|---------------------------------------------------------------------|
| 0x0001           | HID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

### HID Descriptor Retrieval



Typical Retrieval of the HID Descriptor

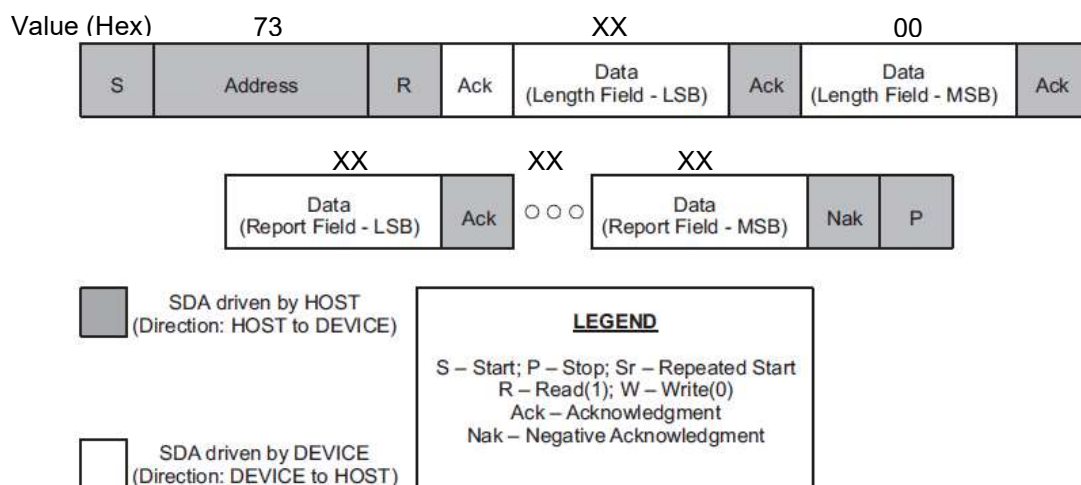
## Report Descriptor Retrieval



### 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 SK5221 receives powered-on-reset or after the SK5221 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

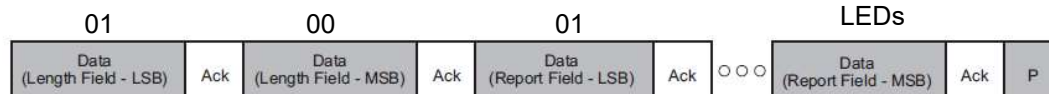
| Byte0 | Definition               | Value | Bit7   | Bit6 | Bit5 | Bit4 | Bit3 | Bit2          | Bit1         | Bit0        |
|-------|--------------------------|-------|--------|------|------|------|------|---------------|--------------|-------------|
| 0     | Length Low Byte          | 06    | 0      | 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

Value (Hex) 76

04

00



SDA driven by HOST  
(Direction: HOST to DEVICE)

SDA driven by DEVICE  
(Direction: DEVICE to HOST)

#### LEGEND

S – Start; P – Stop; Sr – Repeated Start  
R – Read(1); W – Write(0)  
Ack – Acknowledgment  
Nak – Negative Acknowledgment

### Set Keyboard LEDs

| Byte0 | Definition       | Value | Bit7 | Bit6 | Bit5 | Bit4 | Bit3 | Bit2 | Bit1 | Bit0 |
|-------|------------------|-------|------|------|------|------|------|------|------|------|
| 0     | Length Low Byte  | 04    | 0    | 0    | 0    | 0    | 0    | 1    | 0    | 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 | Wireless<br>-LED0 | Mic<br>Mute<br>-LED1 | Speaker<br>Mute<br>-LED2 | Kana -<br>LED3 | Compose<br>- LED4 | Scroll<br>Lock -<br>LED5 | Caps<br>Lock<br>- LED8 | Num<br>Lock<br>- LED6 |

Fn LED is controlled by SK5221 automatically.

## 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 SK5221.

| 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, and device is in lowest current mode (will still detect key presses)                                        |

## KEYBOARD MATRIX DESIGN

### Four Keyboard Matrix

The SK5221 supports four 8X20 keyboard matrixes for the following cases: LFn off/on, RFn off/on.

### Design Keyboard Matrix

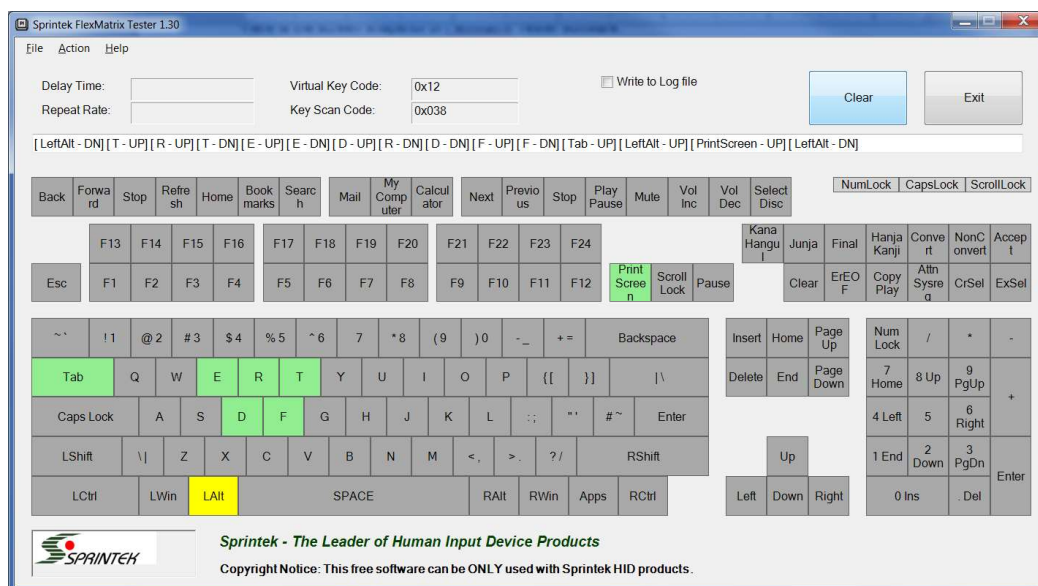
Please refer to Microsoft Windows Platform Design Notes "Keyboard Scan Code Specification" to get more information.

### Test Keyboard Matrix

Sprintek offers a keyboard test tool to verify your keyboard design. The FlexMatrix Tester software can be downloaded from the download page on the Sprintek web site

<http://sprintek.com/support/Downloads.aspx>

Here is the screen snapshot of FlexMatrix Tester software.



## 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.

The following is key matrix table when Fn is off.

|    | C0  | C1     | C2  | C3                  | C4  | C5  | C6 | C7   | C8             | C9                | C10           | C11  | C12 | C13   | C14    | C15   |
|----|-----|--------|-----|---------------------|-----|-----|----|------|----------------|-------------------|---------------|------|-----|-------|--------|-------|
| R0 | Z   | X      | C   | INTL2<br>(Katakana) | K42 | T   | Y  | <,   | >.             | \                 | Enter         |      | NUM | 2     |        |       |
| R1 | Q   | W      | E   | Fn                  | P   | R   | U  | I    | O              | Delete            | APPS          | KA   | 7   | *     |        |       |
| R2 | A   | S      | D   | F6                  | ;;  | \$4 | &7 | K    | L              | + =               | {[            | KB   | 4   | 9     |        |       |
| R3 | !1  | @2     | #3  | Home                | )0  | F   | J  | (9   | *8             | F9                | F10           |      | 1   | 6     |        |       |
| R4 | ~`  | CAPS   | ESC | Down<br>Arrow       | _ - | B   | N  | End  | INTL3<br>(Yen) | Right<br>Arrow    | F12           | RAlt | 0   | 3     | RShift | RCtrl |
| R5 | F3  | K107   | F1  |                     | }]  | G   | H  | PgDn | LWin           | Left<br>Arrow     | Back<br>Space |      | /   | . Del | `      |       |
| R6 | F2  | F4     | Tab | SPACE               | F8  | V   | M  | F7   | INTL1<br>(Ro)  | PgUp              | F11           | LAlt | 8   | -     |        |       |
| R7 | K45 | NEnter | F5  | INTL5<br>(Muhenkan) | ?/  | %5  | ^6 | ""   | KC             | INTL4<br>(Henkan) | Up<br>Arrow   |      | 5   | +     | LShift | LCtrl |

The following is key matrix table when Fn is on.

|    | C0    | C1    | C2    | C3    | C4    | C5 | C6 | C7    | C8 | C9    | C10    | C11 | C12 | C13 | C14 | C15 |
|----|-------|-------|-------|-------|-------|----|----|-------|----|-------|--------|-----|-----|-----|-----|-----|
| R0 |       |       |       |       |       |    |    |       |    |       |        |     |     |     |     |     |
| R1 |       |       |       | Fn    |       |    |    |       |    |       |        |     |     |     |     |     |
| R2 |       |       |       | FN_F6 |       |    |    |       |    |       |        |     |     |     |     |     |
| R3 |       |       |       |       |       |    |    |       |    | FN_F9 | FN_F10 |     |     |     |     |     |
| R4 |       |       |       |       |       |    |    |       |    |       | FN_F12 |     |     |     |     |     |
| R5 | FN_F3 |       | FN_F1 |       |       |    |    |       |    |       |        |     |     |     |     |     |
| R6 | FN_F2 | FN_F4 |       |       | FN_F8 |    |    | FN_F7 |    |       | FN_F11 |     |     |     |     |     |
| R7 |       |       | FN_F5 |       |       |    |    |       |    |       |        |     |     |     |     |     |

## SPEICAL KEY SCAN CODES

The following special keys are defined with vendor defined scan code in HID page C. The report format can be seen at “Consumer Key Input Report (HID Page C)” section.

| Physical Key | I2C Key Scan Code (Page C) |
|--------------|----------------------------|
| Fn + F1      | 0F01                       |
| Fn + F2      | 0F02                       |

|          |      |
|----------|------|
| Fn + F3  | 0F03 |
| Fn + F4  | 0F04 |
| Fn + F5  | 0F05 |
| Fn + F6  | 0F06 |
| Fn + F7  | 0F07 |
| Fn + F8  | 0F08 |
| Fn + F9  | 0F09 |
| Fn + F10 | 0F0A |
| Fn + F11 | 0F0B |
| Fn + F12 | 0F0C |
| KA       | 0F0D |
| KB       | 0F0E |
| KC       | 0F0F |

## 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/>).

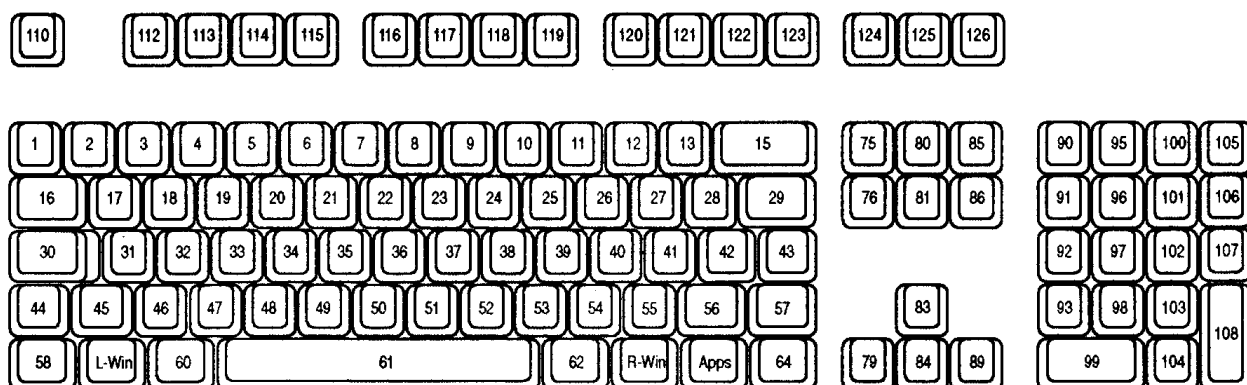
HID over I2C keyboard controller use the same scan code as USB keyboard controller.

**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<br>(Dec) | Program<br>Code | Description             | AT-<br>101<br>(Dec) | USB<br>Page<br>(Hex) | USB<br>Usage<br>(Hex) | Set 1<br>Make<br>(Hex) | Set 1<br>Break<br>(Hex) | Set 2<br>Make<br>(Hex) | Set 2<br>Break<br>(Hex) | Set 3<br>Make<br>(Hex) | Set 3<br>Break<br>(Hex) |
|---------------|-----------------|-------------------------|---------------------|----------------------|-----------------------|------------------------|-------------------------|------------------------|-------------------------|------------------------|-------------------------|
| 0             | No Key          | No Event                | N/A                 | 07                   | 00                    | None                   | None                    | None                   | None                    | None                   | None                    |
| 1             | ROLLOVER        | Keyboard ErrorRollOver  | N/A                 | 07                   | 01                    | FF                     | None                    | 00                     | None                    | None                   | None                    |
| 2             | POSTFAIL        | Keyboard POSTFail       | N/A                 | 07                   | 02                    | FC                     | None                    | FC                     | None                    | None                   | None                    |
| 3             | UNDEFINED       | Keyboard ErrorUndefined | 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                   |

## SKey and Scan Code Table – Continued

| SKEY<br>(Dec) | Program<br>Code | Description                 | AT-<br>101<br>(Dec) | USB<br>Page<br>(Hex) | USB<br>Usage<br>(Hex) | Set 1<br>Make<br>(Hex) | Set 1<br>Break<br>(Hex) | Set 2<br>Make<br>(Hex)        | Set 2<br>Break<br>(Hex) | Set 3<br>Make<br>(Hex) | Set 3<br>Break<br>(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 ; and ' and "      | 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                    | 57                     | D7                      | 78                            | F0 78                   | 56                     | F0 56                   |
| 69            | F12             | Keyboard F12                | 123                 | 07                   | 45                    | 58                     | 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<br>E19D C5    | None                    | E1 14 77<br>E1 F0 14<br>F0 77 | None                    | 62                     | F0 62                   |

## SKey and Scan Code Table – Continued

| SKEY<br>(Dec) | Program<br>Code | Description                 | AT-<br>101<br>(Dec) | USB<br>Page<br>(Hex) | USB<br>Usage<br>(Hex) | Set 1<br>Make<br>(Hex) | Set 1<br>Break<br>(Hex) | Set 2<br>Make<br>(Hex) | Set 2<br>Break<br>(Hex) | Set 3<br>Make<br>(Hex) | Set 3<br>Break<br>(Hex) |
|---------------|-----------------|-----------------------------|---------------------|----------------------|-----------------------|------------------------|-------------------------|------------------------|-------------------------|------------------------|-------------------------|
| 72            | PULSE           | Keyboard Break (Ctrl+Pause) | 126                 | 07                   | 48                    | E0 46 E0<br>C6         | None                    | E0 7E E0<br>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           | Keyboard 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             | Keyboard F13                | U/A                 | 07                   | 68                    | 64                     | E4                      | 08                     | F0 08                   | 08                     | F0 08                   |
| 105           | F14             | Keyboard F14                | U/A                 | 07                   | 69                    | 65                     | E5                      | 10                     | F0 10                   | 10                     | F0 10                   |
| 106           | F15             | Keyboard F15                | U/A                 | 07                   | 6A                    | 66                     | E6                      | 18                     | F0 18                   | 18                     | F0 18                   |
| 107           | F16             | Keyboard F16                | U/A                 | 07                   | 6B                    | 67                     | E7                      | 20                     | F0 20                   | 20                     | F0 20                   |

## SKey and Scan Code Table – Continued

| SKEY<br>(Dec) | Program<br>Code | Description                             | AT-<br>101<br>(Dec) | USB<br>Page<br>(Hex) | USB<br>Usage<br>(Hex) | Set 1<br>Make<br>(Hex) | Set 1<br>Break<br>(Hex) | Set 2<br>Make<br>(Hex) | Set 2<br>Break<br>(Hex) | Set 3<br>Make<br>(Hex) | Set 3<br>Break<br>(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           | LCTRL           | Keyboard LeftControl                    | 58                  | 07                   | E0                    | 1D                     | 9D                      | 14                     | F0 14                   | 11                     | F0 11                   |
| 117           | LSHIFT          | Keyboard LeftShift                      | 44                  | 07                   | E1                    | 2A                     | AA                      | 12                     | F0 12                   | 12                     | F0 12                   |
| 118           | LALT            | Keyboard LeftAlt                        | 60                  | 07                   | E2                    | 38                     | B8                      | 11                     | F0 11                   | 39                     | F0 39                   |
| 119           | LWIN            | Keyboard Left GUI                       | 127                 | 07                   | E3                    | E0 5B                  | E0 DB                   | E0 1F                  | E0 F0 1F                | 8B                     | F0 8B                   |
| 120           | RCTRL           | Keyboard RightControl                   | 64                  | 07                   | E4                    | E0 1D                  | E0 9D                   | E0 14                  | E0 F0 14                | 58                     | F0 58                   |
| 121           | RSHIFT          | Keyboard RightShift                     | 57                  | 07                   | E5                    | 36                     | B6                      | 59                     | F0 59                   | 59                     | F0 59                   |
| 122           | RALT            | Keyboard RightAlt                       | 62                  | 07                   | E6                    | E0 38                  | E0 B8                   | E0 11                  | E0 F0 11                | 39                     | F0 39                   |
| 123           | RWIN            | Keyboard Right GUI                      | 128                 | 07                   | E7                    | 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 ,<br>(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           | Keyboard Int'l 1 (Ro)                   | 56                  | 07                   | 87                    | 73                     | F3                      | 51                     | F0 51                   | 51                     | F0 51                   |
| 136           | INTL2           | Keyboard Int'l 2<br>(Katakana/Hiragana) | 133                 | 07                   | 88                    | 70                     | F0                      | 13                     | F0 13                   | 87                     | F0 87                   |
| 137           | INTL3           | Keyboard Int'l 3 (Yen)                  | 14                  | 07                   | 89                    | 7D                     | FD                      | 6A                     | F0 6A                   | 5D                     | F0 5D                   |
| 138           | INTL4           | Keyboard Int'l 4 (Henkan)               | 132                 | 07                   | 8A                    | 79                     | F9                      | 64                     | F0 64                   | 86                     | F0 86                   |
| 139           | INTL5           | Keyboard Int'l 5 (Muhenkan)             | 131                 | 07                   | 8B                    | 7B                     | FB                      | 67                     | F0 67                   | 85                     | F0 85                   |
| 140           | INTL6           | Keyboard Int'l 6 (PC9800 Keypad .)      | U/A                 | 07                   | 8C                    | 5C                     | DC                      | 27                     | F0 27                   | U/A                    | U/A                     |
| 141           | INTL7           | Keyboard Int'l 7                        | U/A                 | 07                   | 8D                    | U/A                    | U/A                     | U/A                    | U/A                     | U/A                    | U/A                     |
| 142           | INTL8           | Keyboard 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<br>(Dec) | Program<br>Code | Description                          | AT-<br>101<br>(Dec) | USB<br>Page<br>(Hex) | USB<br>Usage<br>(Hex) | Set 1<br>Make<br>(Hex) | Set 1<br>Break<br>(Hex) | Set 2<br>Make<br>(Hex) | Set 2<br>Break<br>(Hex) | Set 3<br>Make<br>(Hex) | Set 3<br>Break<br>(Hex) |
|---------------|-----------------|--------------------------------------|---------------------|----------------------|-----------------------|------------------------|-------------------------|------------------------|-------------------------|------------------------|-------------------------|
| 143           | INTL9           | Keyboard Intl 9                      | U/A                 | 07                   | 8F                    | U/A                    | U/A                     | U/A                    | U/A                     | U/A                    | U/A                     |
| 144           | LANG1           | Keyboard LANG 1<br>(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<br>(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 DF                   | 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           | RFN             | 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                  | E0 99                   | E0 4D                  | E0 F0 4D                | U/A                    | U/A                     |
| 162           | PVTRK           | Scan Previous Track                  | U/A                 | 0C                   | 00B6                  | E0 10                  | E0 90                   | E0 15                  | E0 F0 15                | U/A                    | U/A                     |
| 163           | STOP            | Stop                                 | U/A                 | 0C                   | 00B7                  | E0 24                  | E0 A4                   | E0 3B                  | E0 F0 3B                | U/A                    | U/A                     |
| 164           | PLAY            | Play/Pause                           | U/A                 | 0C                   | 00CD                  | E0 22                  | E0 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                  | E0 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                  | E0 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<br>(Dec) | Program<br>Code | Description                | AT-<br>101<br>(Dec) | USB<br>Page<br>(Hex) | USB<br>Usage<br>(Hex) | Set 1<br>Make<br>(Hex) | Set 1<br>Break<br>(Hex) | Set 2<br>Make<br>(Hex) | Set 2<br>Break<br>(Hex) | Set 3<br>Make<br>(Hex) | Set 3<br>Break<br>(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           | CCFG            | 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           | WRFSH           | 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                     |

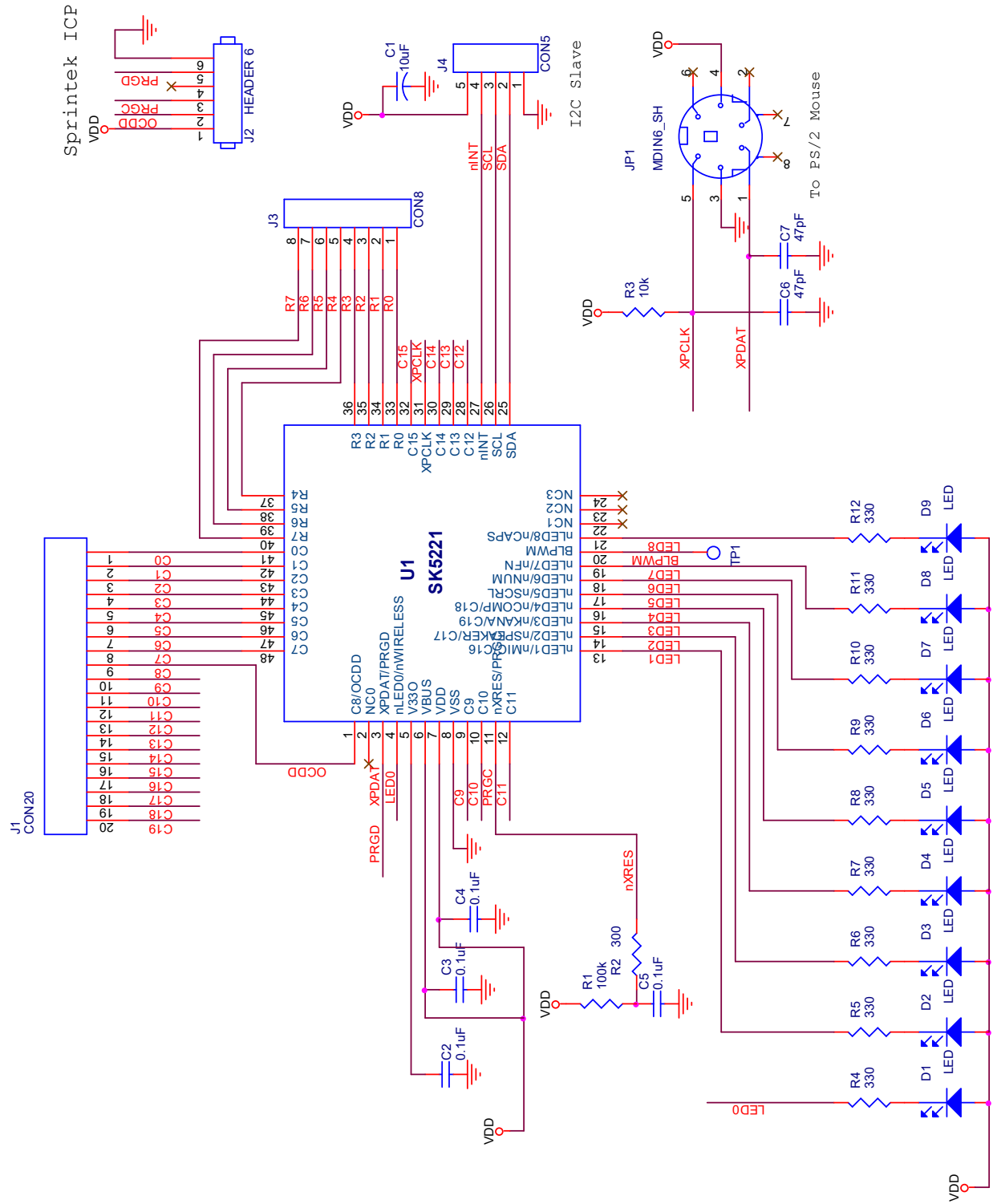
## SKey and Scan Code Table – Continued

| SKEY<br>(Dec) | Program<br>Code | Description        | AT-<br>101<br>(Dec) | USB<br>Page<br>(Hex) | USB<br>Usage<br>(Hex) | Set 1<br>Make<br>(Hex) | Set 1<br>Break<br>(Hex) | Set 2<br>Make<br>(Hex) | Set 2<br>Break<br>(Hex) | Set 3<br>Make<br>(Hex) | Set 3<br>Break<br>(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<br>(Dec) | Program<br>Code | Description | AT-<br>101<br>(Dec) | USB<br>Page<br>(Hex) | USB<br>Usage<br>(Hex) | Set 1<br>Make<br>(Hex) | Set 1<br>Break<br>(Hex) | Set 2<br>Make<br>(Hex) | Set 2<br>Break<br>(Hex) | Set 3<br>Make<br>(Hex) | Set 3<br>Break<br>(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



# 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 | 2.21  | -    | 5.5   | V     |       |
| IDD    | Supply Current when no key is pressed             |       | 0.3  | 2     | uA    | 5V    |
|        |                                                   |       | 0.1  | 1     | uA    | 3.3V  |
| IDDK   | Supply Current when one key is pressed            |       | 1.5  |       | mA    | 5V    |
|        |                                                   |       | 0.75 |       | mA    | 3.3V  |
| LVR    | Low voltage reset                                 | 1.995 | 2.1  | 2.205 | V     |       |
| RPU    | Pull-up Resistor                                  | 10    | 30   | 50    | kΩ    | 5V    |
|        |                                                   | 20    | 60   | 100   | kΩ    | 3.3V  |

## GPIO Electrical Characteristics

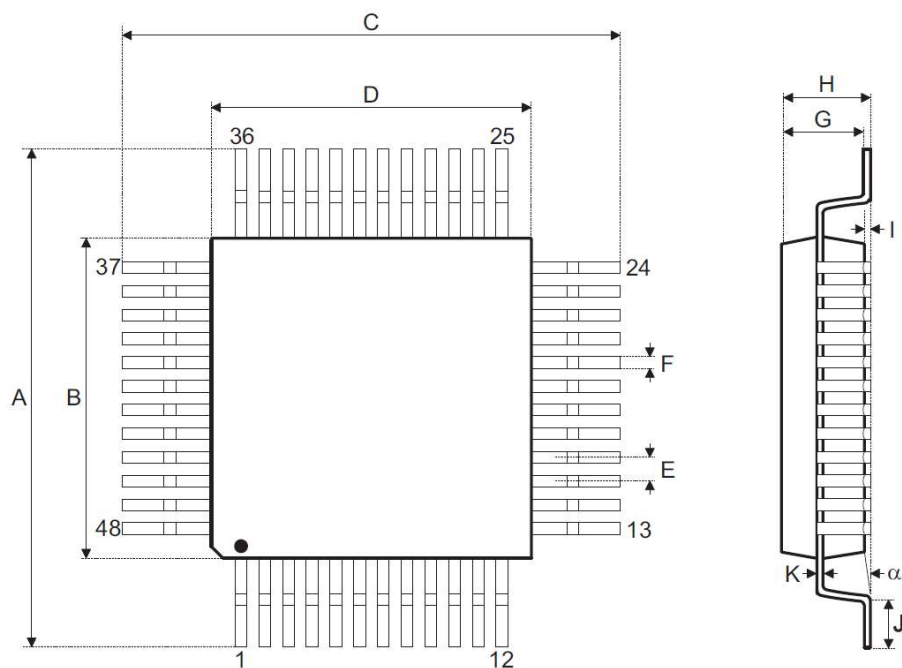
| Symbol | Description             | Min    | Typ  | Max    | Units | Notes               |
|--------|-------------------------|--------|------|--------|-------|---------------------|
| VIL    | Input Low Level         | -      | -    | 0.2VDD | V     |                     |
| VIH    | Input High Level        | 0.8VDD | -    | -      | V     |                     |
| BLFPWM | Backlight PWM frequency | 2.93   | 5.86 | 23.4   | KHz   | 5.86KHz is default. |

## I2C Slave Electrical Characteristics

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

## PACKAGING INFORMATION

### SK5221 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 |
| $\alpha$ | 0°               | -       | 7°   |

**SK5221 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     |
|----------|------------------|-----------------|
| 1.02     | January 24, 2019 | Initial release |