EC2x-QuecOpen

Matrix Keypad Guidelines

LTE Standard Module Series

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Status: Preliminary

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About the Document

History

Revision	Date	Author	Description
1.0	2018-09-30	Gale GAO	Initial
1.1	2019-04-16	Juson ZHANG	Updated Row and Column Pin Description

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1 Introduction

Independent Keypad: Simple programming but wasting IO interface;

Matrix Keypad: Complex programming but saving IO interface;

Matrix Keypad is recommended when the number of keys over 6;

In order to meet the customer's requirement for Matrix Keypad, this document provides driver, device tree debugging guidance and user-layer program example.

2 Matrix Keypad Hardware Design

Common reference design as the following 4*4 matrix keypad;

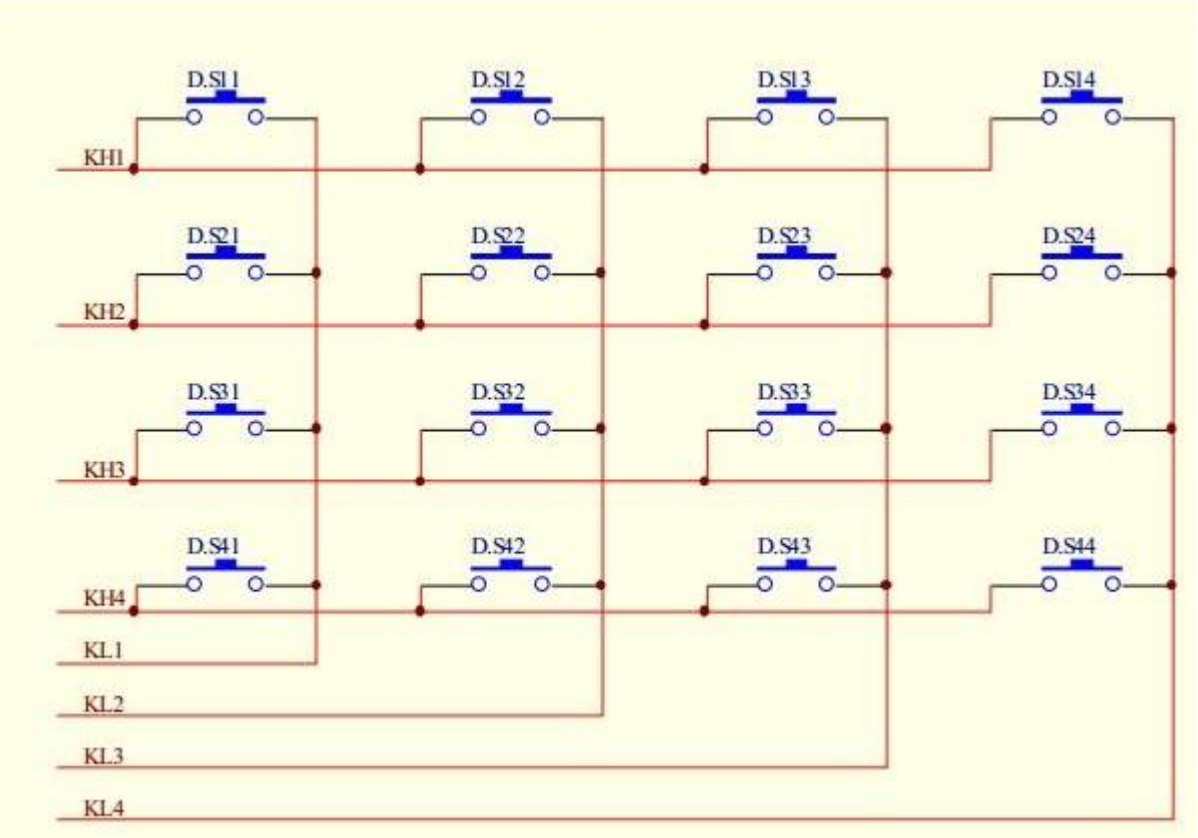

Figure 1：4*4 Matrix Keypad

3 Driver and Device Tree

3.1. Add Matrix Keypad Configuration to Device Tree

Add following Matrix Keypad configuration under the file: *mdm9607.dtsi.*

- Attribute explanation:
  debounce-delay-ms: Time for key anti-shake;
  col-scan-delay-us: Column scan delay after the key is triggered;
  linux,wakeup: Support key wake up module;
  row-gpios: GPIO number used in ROW;
  col-gpios: GPIO number used in COLUMN;
  linux-keymap: Keycodes for row and column and also for reporting to APP;

  Reference to device tree confirguration:
  ql-ol-kernel/msm-3.18/Documentation/devicetree/bindings/input/gpio-matrix-keypad.txt

- Function description:
  As input pin, columns select IO that in support of interrupting wake up and keep default internal pull down;
  As output pin, rows drive default configuration and output high-level
  When edge is triggered, both rising edge and falling edge will be reported;

  Driver source code:
  ql-ol-kernel/msm-3.18/drivers/input/keypad/matrix_keypad.c

  User-layer program refers to ***chapter 4.***

```
--- ql-ol-kernel-orig/arch/arm/boot/dts/qcom/mdm9607.dtsi   2018-05-12 19:02:48.000000000 +0800
+++ ql-ol-kernel/arch/arm/boot/dts/qcom/mdm9607.dtsi    2018-06-26 09:33:51.915118760 +0800
@@ -1849,6 +1849,65 @@
         interrupts = <0x0 0xA1 0x0>; /* PMD9607 MPP 2 */
         interrupt-names = "vbus_det_irq";
     };
+
+    matrix-keypad {
+        compatible = "gpio-matrix-keypad";
+        debounce-delay-ms = <20>;
+        col-scan-delay-us = <2>;
+        linux,no-autorepeat;
+        /*linux,clustered_irq = <88>;
+        linux,clustered_irq_flags = <0x1>;*/
+        linux,wakeup;
+
+        row-gpios = <&tlmm_pinmux 3 0
+                 &tlmm_pinmux 5 0
+                 &tlmm_pinmux 34 0
+                 &tlmm_pinmux 42 0
+                 &tlmm_pinmux 75 0>;
+
+        col-gpios = <&tlmm_pinmux 0 0
+                 &tlmm_pinmux 2 0
+                 &tlmm_pinmux 4 0
+                 &tlmm_pinmux 10 0
+                 &tlmm_pinmux 24 0
+                 &tlmm_pinmux 25 0>;
+
+        linux,keymap = <0x00000000  /* 1st col */
+                0x01000001
+                0x02000002
+                0x03000003
+                0x04000004
+
+                0x00010005  /* 2nd col */
+                0x01010006
+                0x02010007
+                0x03010008
+                0x04010009
+
+                0x0002000a
+                0x0102000b
+                0x0202000c
+                0x0302000d
+                0x0402000e
+
+                0x0003000f
+                0x01030010
+                0x02030011
+                0x03030012
+                0x04030013
+
+                0x00040014
+                0x01040015
+                0x02040016
+                0x03040017
+                0x04040018
+
+                0x00050019
+                0x0105001a
+                0x0205001b
+                /*0x0305001c
+                0x0405001d*/>;
+    };
 };

 #include "mdm9607-rpm-regulator.dtsi"
```

3.2. Enable Matrix Keypad Kernel Option

ql-ol-sdk$ make kernel_menuconfig

ql-ol-sdk$ make kernel

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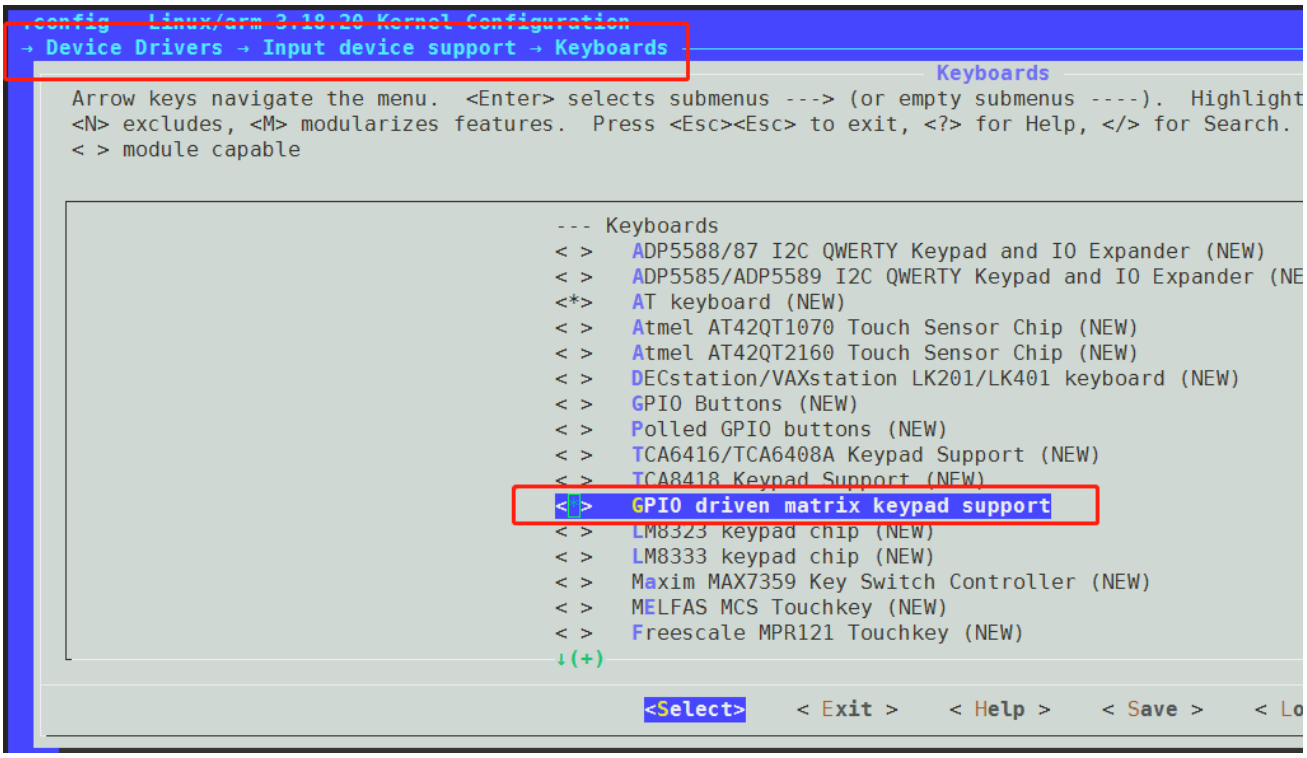

4 Application Example

矩阵键盘-支持唤醒

The Matrix Keypad directory in the attachment above needs to be copied under QL-OL-EXTSDK for compilation, and then download the executable program to the module for testing; When the key is triggered, users can see the key code is reported, as well as under sleep state.