CY7C634XX and CY7C635XX USB Keyboard Families: Power-On Reset Considerations

There are two important cases of initial V_{CC} voltage considerations that the system designer using our USB Keyboard Microcontroller must be aware of and plan for. These are: (1) the slow voltage rise during a cold power-up of the host PC and (2) the fast voltage rise during hot-plugging into an already stable USB bus.

The USB Keyboard families have built-in circuitry that resets the Microcontroller during an initial V_{CC} voltage ramp. This internal circuitry can accommodate V_{CC} voltage ramp rates between 10 µs and 200 ms, but is not able to differentiate between these four decades of variation.

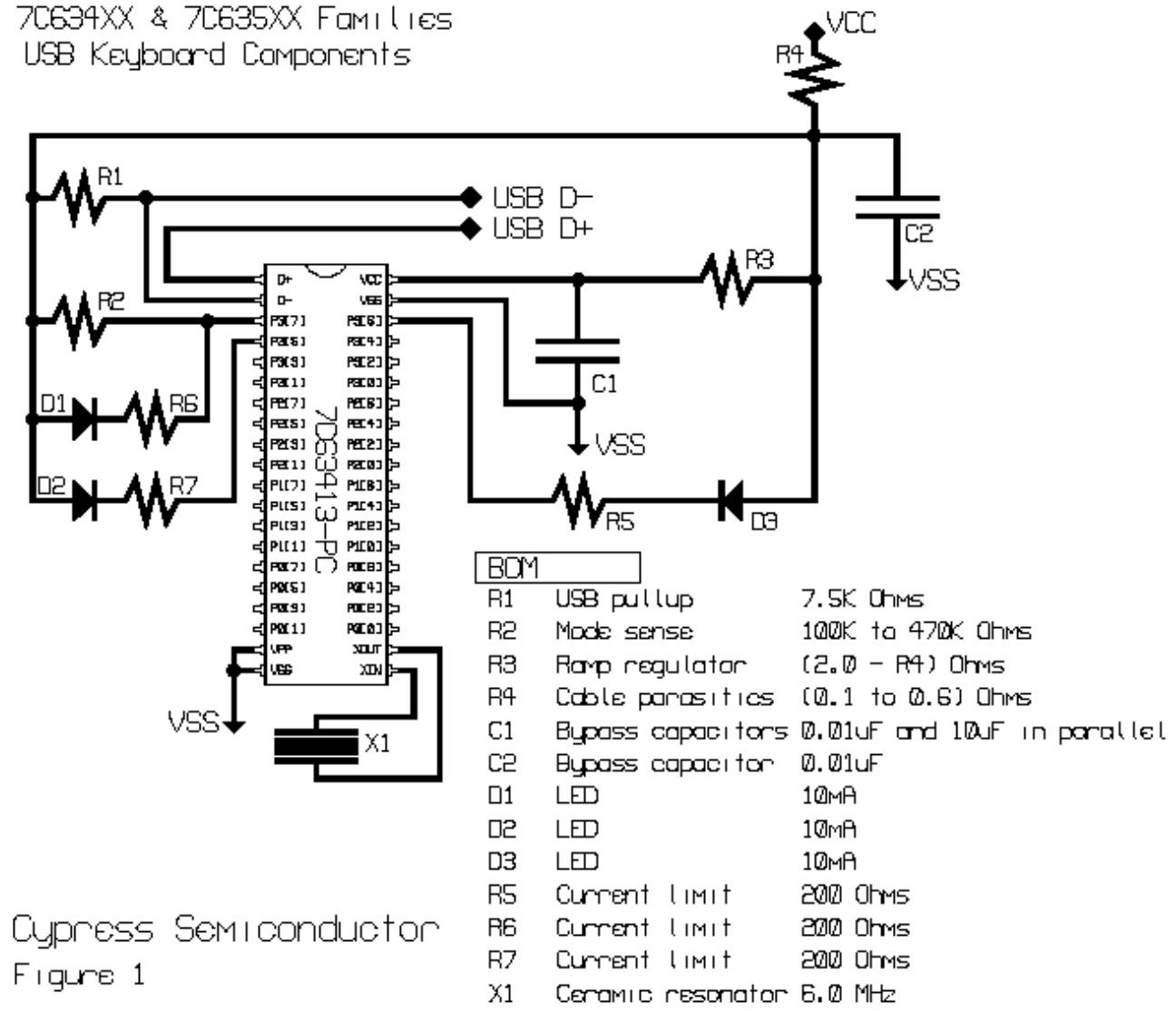
The correct sequence for a USB hot-plug event is as follows:

1. Microcontroller experiences V_{CC} ramp (which must be constrained to be greater than 10 µs).
2. Port 3 bit 7 is at a logic high with respect to V_{CC} during the voltage ramp (see next section).
3. No USB traffic occurs after the ramp so the device goes into suspend.
4. A Bus Reset takes the device out of suspend and the Microcontroller begins at the reset vector.
5. Device awaits for enumeration or loss of keep-alive.

Our other USB Microcontroller families go immediately into suspend after the Power-On-Reset event (POR), however, the 7C634XX/5XX families have an extra mode that allows them to operate in non-USB applications. To support those applications, one of the LED ports pins (Port 3 bit 7) is used only during the POR event to distinguish between USB and non-USB applications. This is documented in the datasheet in section 8.1, and is illustrated in the schematic diagram *Figure 1*, and is reviewed as follows:

1. Cable and connector resistance can be as small as 0.1 Ohms and as large as 0.6 Ohms in typical applications.
2. The RC time constant to the V_{CC} pin must be greater than 10 µs.
3. The LEDs and R1 must be tied to the lowest resistance path to V_{CC}.
4. The V_{CC} pin must be bypassed for high-frequency noise (0.01 µF).
5. The USB V_{CC} entry point should be bypassed for high-frequency noise (C2).
6. Port 3 pin 7 must be pulled to V_{CC} during initial V_{CC} voltage ramp, for USB operation.
7. V_{PP} must be tied to V_{SS}.
8. LEDs are driven by sinking current, and require current limiting resistors (R5,6,7)

To use the 7C634XX/5XX Microcontrollers in applications which require that the unit not go into suspend upon POR, the Port 3 bit 7 pin must be pulled to V_{SS} during POR (this mode is not shown in *Figure 1*). This precludes this pin from functioning as a LED driver, but does not destroy the utility of this pin. The value of the pull-down resistor from Port 3 bit 7 to V_{SS} can be any convenient value from 470K to 0 Ohms.



BOM		
R1	USB pullup	7.5K Ohms
R2	Mode sense	100K to 470K Ohms
R3	Ramp regulator	(2.0 - R4) Ohms
R4	Cable parasitics	(0.1 to 0.6) Ohms
C1	Bypass capacitors	0.01uF and 10uF in parallel
C2	Bypass capacitor	0.01uF
D1	LED	10mA
D2	LED	10mA
D3	LED	10mA
R5	Current limit	200 Ohms
R6	Current limit	200 Ohms
R7	Current limit	200 Ohms
X1	Ceramic resonator	6.0 MHz

Figure 1.