

Application Design of Reset circuit

General rule and theory

Application Design of Reset Circuit

When the power is supplied firstly, the stable and accurate reset circuit is need to be organized to operate the MCU. Refer to below contents when designing MCU circuit.

1. Auto Reset Circuit

The below reset circuit explains power-on reset and auto reset operation at $V_{CC} < V_{TH}$.

(V_{TH} : Threshold level)

Standard Circuit

The figure 1.1 is the standard of auto reset circuit.

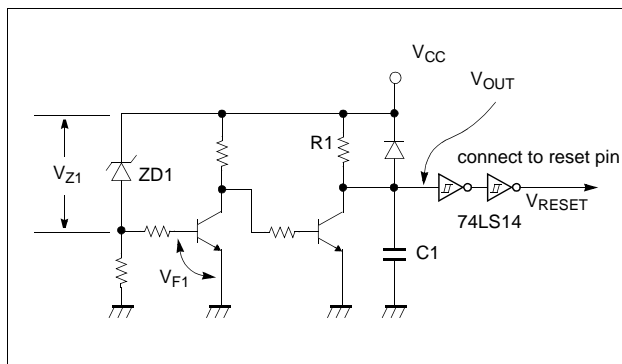


Figure 1-1. Standard Circuit of Auto Reset

Explain of Operation Power-on reset

In Figure 1-2, the V_{OUT} is the same as the voltage charged in $C1$ through $R1$. The rising time of V_{OUT} is decided by charging time ($C1 \times R1$) and power-on reset is operated.

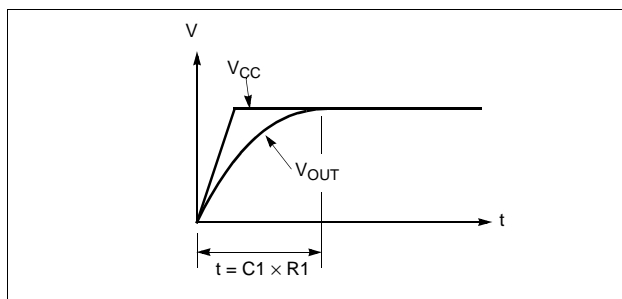


Figure 1-2. Pulse relation of V_{CC} and V_{OUT}

Auto Reset

In Figure 1-1, the auto reset circuit operation is explained like below.

The voltage V_{Z1} supplied to $ZD1$ and the turn-on voltage V_{F1} of $TR1$ are kept uniform regardless of V_{CC} change. And the V_{OUT} is decided out of following several formulas.

$$V_{OUT} = V_{CC} \text{ if } V_{CC} > V_{Z1} + V_{F1}$$

$$V_{OUT} = \text{GND} \text{ if } V_{CC} < V_{Z1} + V_{F1}$$

Output pulse of V_{OUT}

If the V_{CC} descends under V_{TH} , V_{OUT} is low and if the V_{CC} ascends over the V_{TH} , V_{OUT} is high.

For this reason, the stable reset operation can be expected. Refer to Figure 1-3.

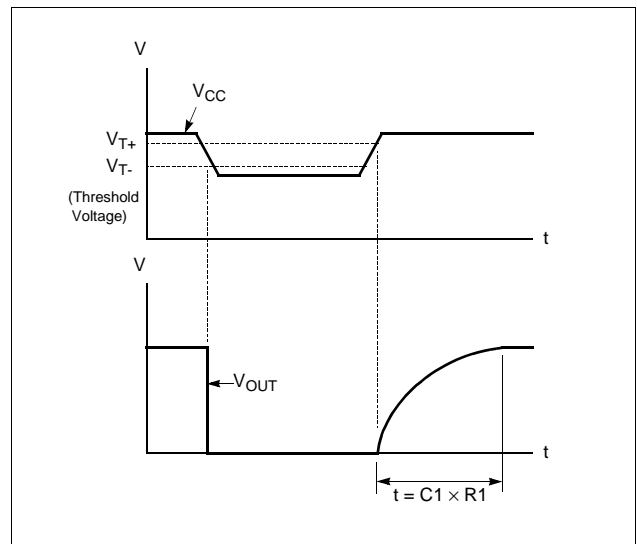


Figure 1-3. V_{OUT} in Auto Reset Operation

2. Manual Reset Circuit

When the MCU is reset by the external reset switch, the switch chattering should not be occurred.

The Figure 2-1 is chattering protection circuit.

Standard Circuit

The Figure 2-1 is standard circuit of manual reset.

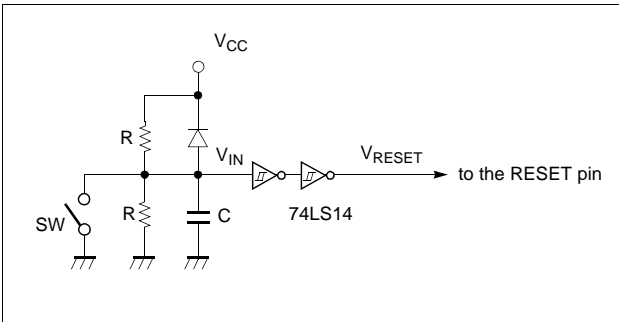


Figure 2-1. Standard Circuit of Manual Reset

Operation of Power-on reset

During power-up, the rising time of V_{IN} charged on condenser C is decided by charging time ($C \times R$) like as Figure 2-2. And the MCU is reset by V_{IN} .

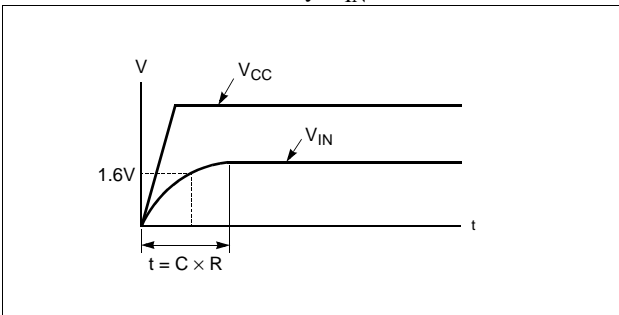


Figure 2-2. V_{IN} in Power-on Reset Circuit

Operation of Manual Reset

If the switch is on, the V_{RESET} is the same as GND level and the MCU is reset. If the switch is off, the condenser starts charging, and the rising time of charged voltage V_{IN} is decided by charging time ($C \times R$). The condenser and Schmitt trigger IC remove the chattering. Refer to Figure 2-3.

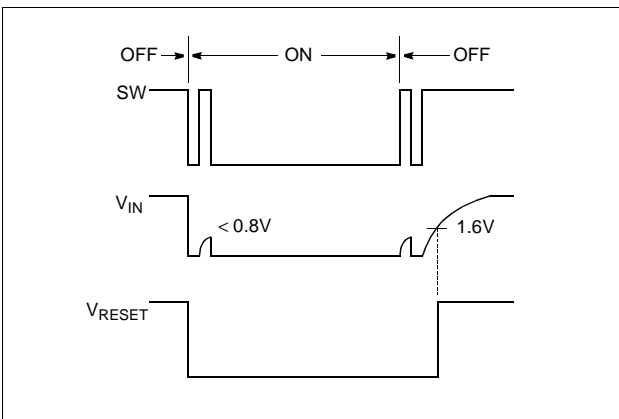
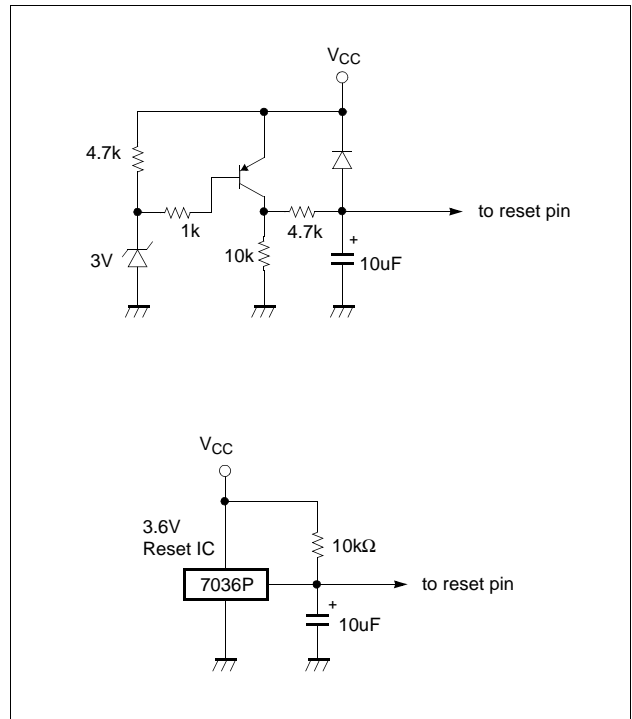


Figure 2-3. Timing Chart of Manual Reset

When the switch changes from Off to On, $V_{RESET} = \text{GND}$ at $V_{IN} < 0.8\text{V}$, when the switch changes from On to Off, $V_{RESET} = V_{CC}$ at $V_{IN} > 1.6\text{V}$.

Example of Practical Application

The left figure shows the reset circuit composed of zener diode and Tr. Cap., the right figure is the reset circuit using reset IC.



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