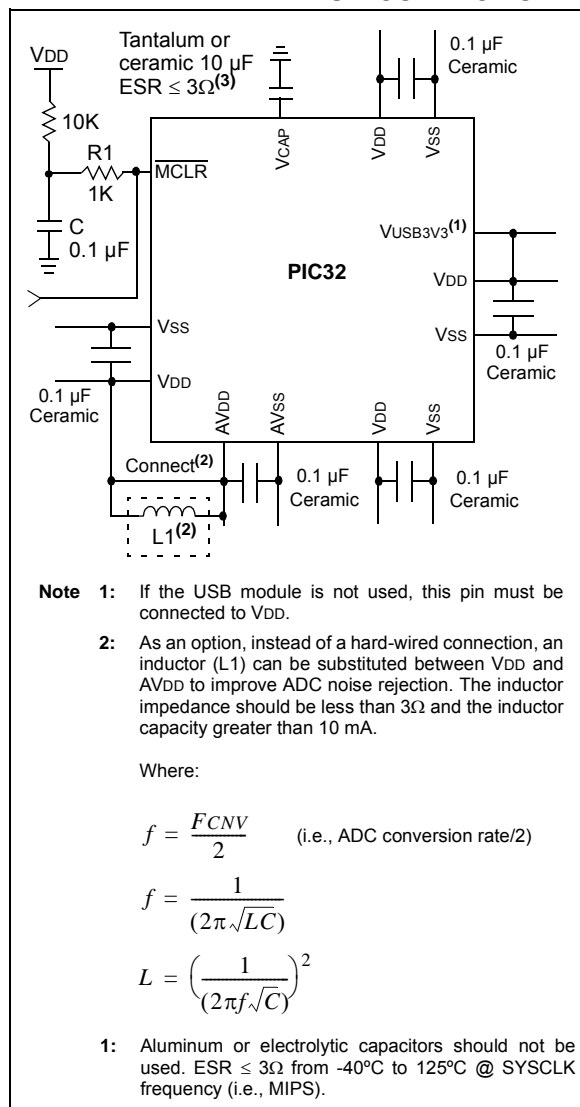


# PIC32MX1XX/2XX 28/36/44-PIN FAMILY

**FIGURE 2-1: RECOMMENDED MINIMUM CONNECTION**



## 2.2.1 BULK CAPACITORS

The use of a bulk capacitor is recommended to improve power supply stability. Typical values range from 4.7 μF to 47 μF. This capacitor should be located as close to the device as possible.

## 2.3 Capacitor on Internal Voltage Regulator (VCAP)

### 2.3.1 INTERNAL REGULATOR MODE

A low-ESR (3 ohm) capacitor is required on the VCAP pin, which is used to stabilize the internal voltage regulator output. The VCAP pin must not be connected to VDD, and must have a CEFC capacitor, with at least a 6V rating, connected to ground. The type can be ceramic or tantalum. Refer to [30.0 "Electrical Characteristics"](#) for additional information on CEFC specifications.

## 2.4 Master Clear (MCLR) Pin

The MCLR pin provides two specific device functions:

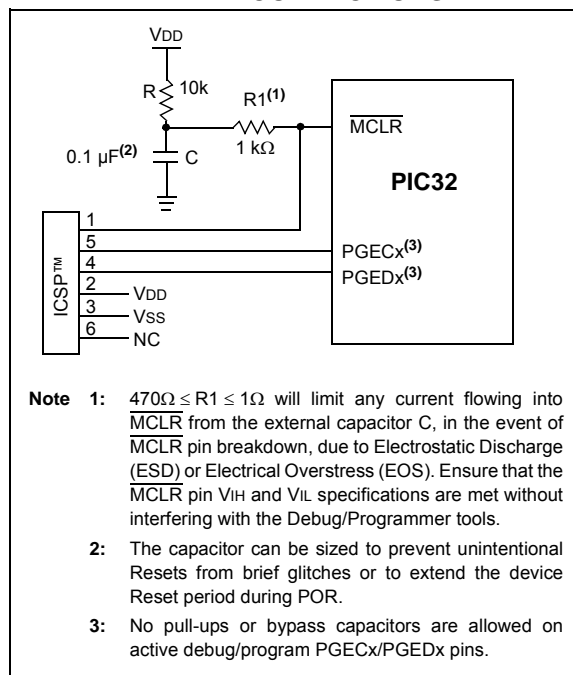
- Device Reset
- Device programming and debugging

Pulling The MCLR pin low generates a device Reset. [Figure 2-2](#) illustrates a typical MCLR circuit. During device programming and debugging, the resistance and capacitance that can be added to the pin must be considered. Device programmers and debuggers drive the MCLR pin. Consequently, specific voltage levels (VIH and VIL) and fast signal transitions must not be adversely affected. Therefore, specific values of R and C will need to be adjusted based on the application and PCB requirements.

For example, as illustrated in [Figure 2-2](#), it is recommended that the capacitor C, be isolated from the MCLR pin during programming and debugging operations.

Place the components illustrated in [Figure 2-2](#) within one-quarter inch (6 mm) from the MCLR pin.

**FIGURE 2-2: EXAMPLE OF MCLR PIN CONNECTIONS**



## 2.5 ICSP Pins

The PGECx and PGEDx pins are used for ICSP and debugging purposes. It is recommended to keep the trace length between the ICSP connector and the ICSP pins on the device as short as possible. If the ICSP connector is expected to experience an ESD event, a series resistor is recommended, with the value in the range of a few tens of Ohms, not to exceed 100 Ohms.