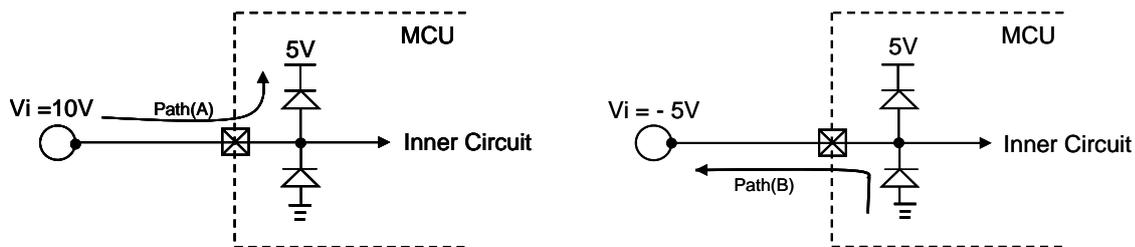


Over Voltage Protection

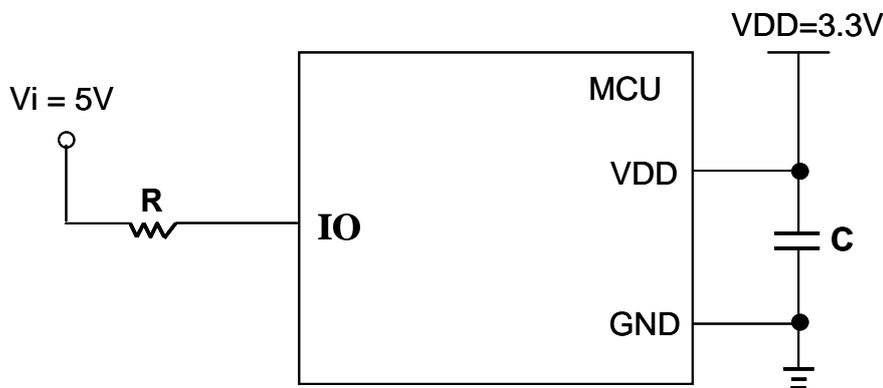
Application Note

Applied for: All PMC & PMS series MCU

For some of MCU application, the IO input voltage may be higher than the IC supply voltage VDD. That high IO input voltage may generate an Injection Current to the VDD through the diode of IO ESD circuit, i.e. Path(A). Similarly, when IO input voltage is lower than the GND, the "Injection" current may be drawn from the IO, i.e. Path(B). For the case, VDD=5V, high IO input voltage=10V and low IO input voltage = -5V, this current flow is shown as below figures:



Either input voltage is higher than VDD or lower than GND may cause MCU permanent damages or cause abnormal MCU operation. Therefore, adding a resistor in-between voltage source and the IO pin to limit the high input voltage $< VDD+0.3V$ and low input voltage $> -0.3V$ and to limit the injection current becomes essential. The application circuit is shown as below,



As an example, for the rated back current $< 1mA$, the resistance "R" is formulated as below,

$$R = (5V - 3.3V) / 1mA \geq 1.7K \text{ ohm}$$



PMC-APN002 Over Voltage Protection

Please notice that, for detecting high input voltage (e.g. Zero crossing detection), please use Pure Digital IO pin (only IO, no ADC input shared). In case it must be connected to an analog/digital input (e.g. PB4/AD3), please keep the injection current as low as possible; otherwise, the accuracy of other ADC channels may be affected.

If you have further questions to the application, please consult to our agent at your nearest location or contact us at fae@padauk.com.tw