Analog Proximity Module –TWS(True Wireless Bluetooth Headset) Wear Detection Application Manual

Figure 1 is the reference circuit diagram of the TWS wearing detection application. PM-2016 uses VCSEL as the emission source, its VF is about 1.6V. It is recommended that the drive current of VCSEL is greater than 5mA. If it drives at 3.3V (GPIO_IR and Vcc = 3.3V), R$_{limit}$ can be set to 300 ohm. R$_L$ can initially be set to 22k ohm, and then adjust the RL value according to the detection distance. (The larger the RL value, the farther the detection distance).
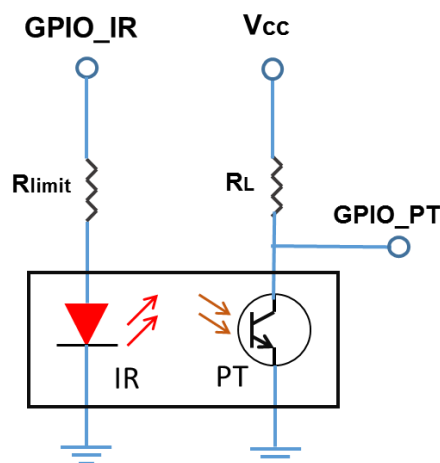

Figure 1. Application circuit diagram

Figure 2 shows the recommended control and detection waveforms in actual use. Considering power consumption and detection speed, it is recommended that the transmission time of GPIO_IR is 300us, then pause for 50ms, then continue to transmit 300us and pause for 50m which is a repeated circle. It is recommended to make the judgment after

three consecutive samplings with the same result. This detection method can detect about 6 times per second.
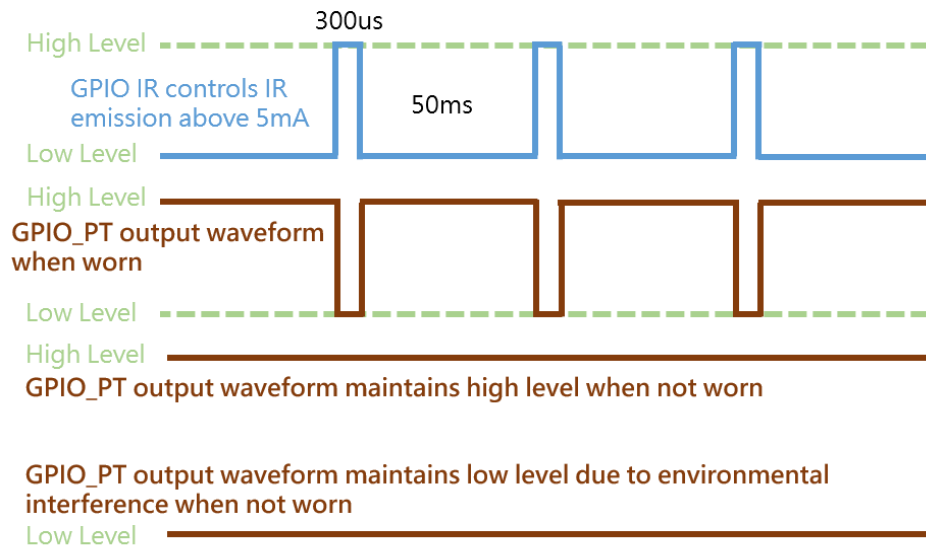
GPIO_IR	GPIO_PT	Determination
High Level	High Level	Not Worn
High Level	Low Level	Worn
Low Level	Low Level	Not Worn (environmental interference)

Figure 2. Control and detection waveform description

Figure 3 is an example of the PT output waveform. It can be found that when the IR transmitter is switched from On to Off, the PT will have a delay time. Therefore, when sampling GPIO_PT, you need to confirm that the PT output voltage is stable to avoid misjudgment.
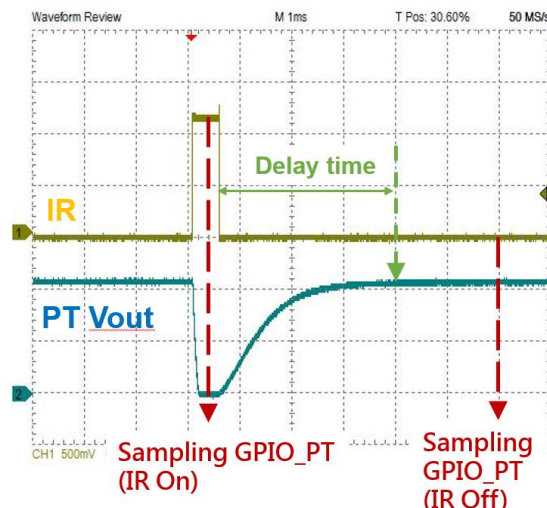

Figure 3. PT output voltage waveform detection

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Figure 4 is a flow chart of single detection judgment, and the process is maintained in subsequent cycles.
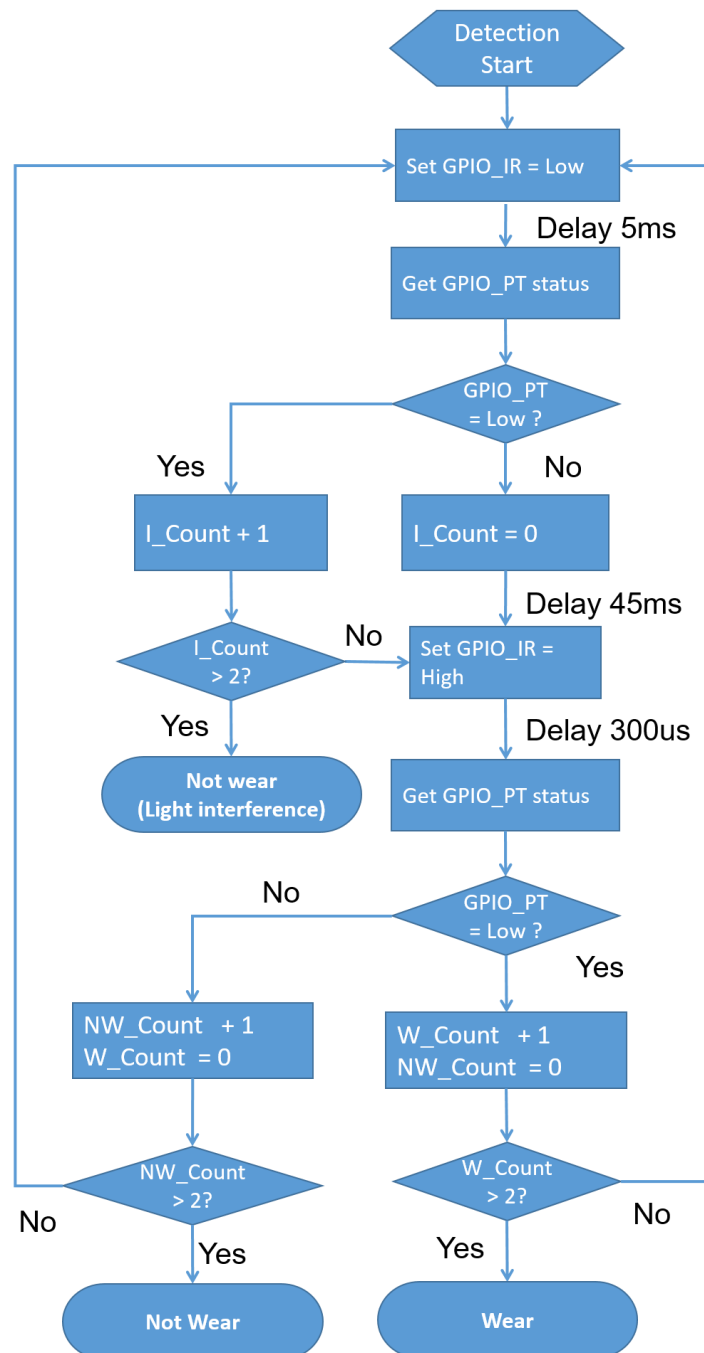

Figure 4. Flow chart of single wear detection

This application manual provides customer design reference. If there are design changes, system performance may be degraded. If there are any problems in the design of the system, please contact Everlight for further technical support.

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