

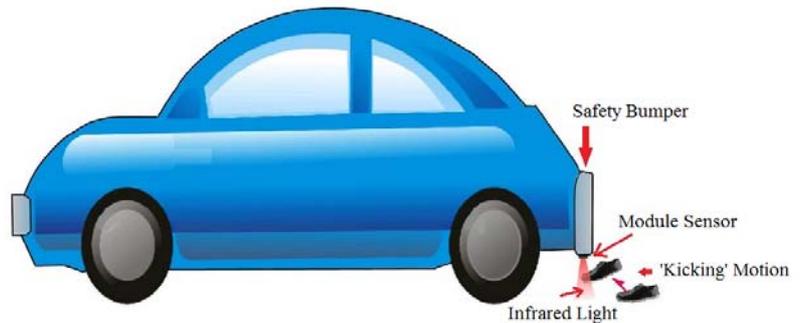


TOUCHLESS SENSOR MODULE

ITTI infrared touchless sensor module reliable to use in Automotive Industry and performance not affect by any environment (sunny, rainy, snowing, day and night). MCU of touchless sensor is in TS16949 standard.

a) One of application in automotive industry is for truck opening, it works under below circumstance:

- Doors in “non-locking” mode
- Car in stop mode
- In parking (P) status.



Once passenger performs “kick” action movement, touchless sensor module will pick up signal and send to ECU, and ECU will give command to open the truck door. When the car is moving (forward and backward, left to right), the module is in sleeping mode. The truck door will not open.

To avoid wrong gesture command, ITTI touchless sensor module only accept gesture of “kick” movement and command of this gesture movement is program into MCU. Our module will not detect wrong gesture command other than “kick” gesture.

b) Touchless module in truck door opening application contain following circuits:

- 1) Infrared sensor
- 2) Touchless MCU board
- 3) I/O board for connect to ECU of car
- 4) USB cable

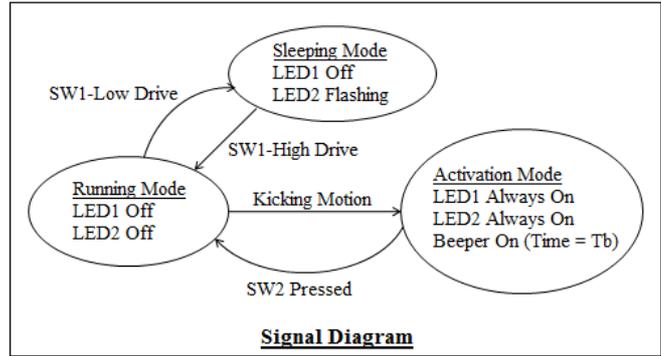
Our touchless module sensor has an internal LED which emits infrared beam. When an object passes by within this emitted light’s perimeter, the object will reflect the light back to the module sensor. The module sensor photodiode then convert the reflected beam into electronic signals and sent to the module IC.

The strength of the reflected signal is affected by the distance between the object and the module sensor. If the object is closer to the module sensor, the stronger will be the reflected signals. Likewise if the object is further away from the module sensor, the reflection signals will be weaker. The trunk controller uses the effect of the change of signal, to determine whether the user created a kicking motion to open the trunk.





Our touchless module has a signal strength ranging from 0-1023. When the module sensor is in idle stage, the module IC will set this signal strength to be around 100. Figure shows a signal change when there is kicking motion detected.



When there is kicking motion detected, the module sensor signal upon reaching L1 level, within T1 seconds, must rise above L2 level and maintaining at T2 seconds. Then this can be considered as an effective motion.

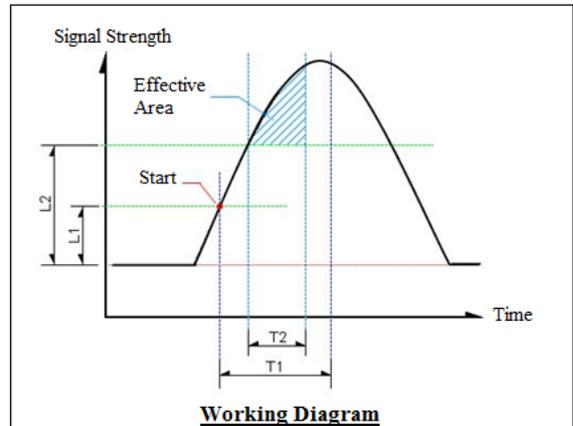
T1 and T2 are two both Timing parameters. They have direct relationship with the kicking speed. If T1 and T2 set value are low, the kicking speed would need to be faster. Likewise if T1 and T2 set value are high, then the kicking speed could be slower.

In the module IC, T1 and T2 are stored at Register #132 and #133 respectively. The module IC has operating cycle of 8ms. Register #132 by default setting is 15 and register #133 is 5. Therefore:

$$T1 = \text{register \#132 set value} * 8 \text{ ms} = 15 * 8 = 120 \text{ ms}$$

$$T2 = \text{register \#133 set value} * 8 \text{ ms} = 40 \text{ ms}$$

Parameters L1 and L2 set value is based on the signal strength. User's kicking motion must make the signal goes above these 2 signal strength (L1 and L2), in order to activate the trunk controller. In actual practice, besides the kicking angle, speed and distance, the signal strength will also be affected by the shoes material, shapes and sizes. Since there are many different types of shoes and the kicking level is also different, the controller receiving signal can have a wide variation. Therefore it is important to adjust the appropriate L1 and L2 set value, base on the actual situation. In the module IC L1 is stored at register #130 and L2 is stored in register #131 and are preset to be 150 and 250 respectively.



For more information of this product, please contact us!

