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DID YOU KNOW? OPTICAL GEAR SHIFT SOLUTIONS

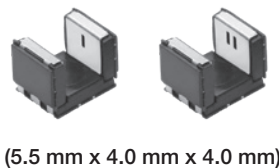
Optical Gear Shift Sensor Solutions: Enhancing Precision and Durability

Gear shift positions are traditionally measured mechanically. Here, we introduce three different solutions that instead use optical sensors, which allows for more flexible designs with lower profiles and less wear and tear, while still maintaining the satisfactory feeling of mechanical movement and gear selection.

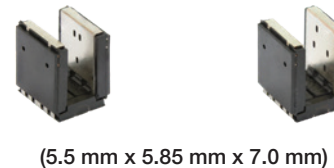
Transmissive Solution

Transmissive sensors are designed with one or two IR emitters across from one or more phototransistors, creating narrow light barriers. If combined with a mechanical encoder, movement or absolute positions can be detected. Using the TCUT1800X01 with four independent channels as our example, up to 16 absolute positions can be identified and detected. We can support the mechanical design of the encoder strip.

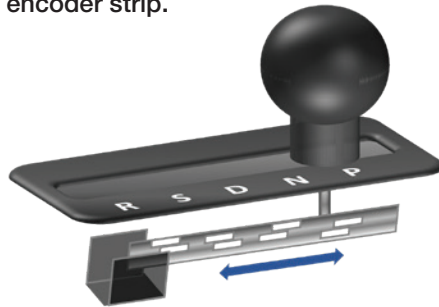
[TCxT1350X01](#)



[TCUT1630X01](#)



[TCUT1800X01](#)



Pros:

16 absolute positions, only one sensor needed

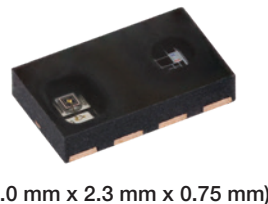
Cons:

Requires precise design and manufacturing of the encoder strip

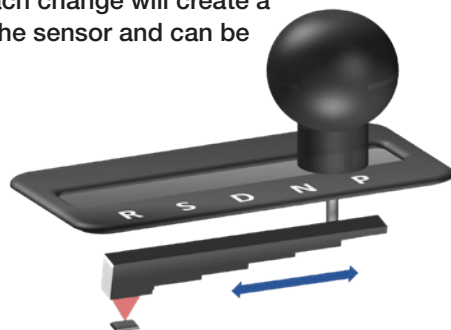
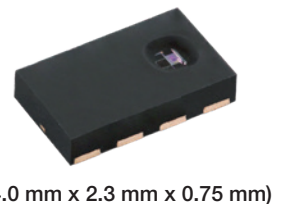
Proximity Solution

With the use of a precise digital integrated proximity sensor such as the VCNL4030X01, a solution to measure the change in position is possible with different detection distances matched to the gear shift positions. As can be seen in the concept drawing above, the sensor measures the distance to a simple mechanical step design, which can be made of plastic. For example, shifting from park to reverse will result in less counts at each position. Assuming the gear shift always starts in a known position such as park, each change will create a jump in output count of the sensor and can be clearly detected.

[VCNL4030X01](#)



[VCNL4035X01](#)



Pros:

Only one sensor, low profile, flexible settings

Cons:

Incremental measurement, not absolute position



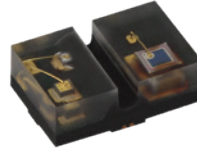
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Reflective Solution

Reflective sensors such as the VCNT2025X01 combine an IR emitter and a phototransistor in a compact and automotive-qualified package. The sensor reacts to close distance objects and is ideally suited for simple “on / off” detections. In the gear sensor design, multiple reflective sensors can be used at each position of the gear shift selector to create a signal once the gear shift is in the matching position.

VCNT2030

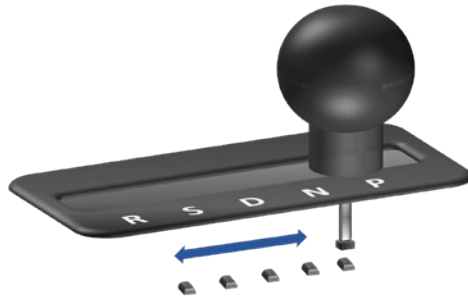


VCSEL Emitter
(1.85 mm x 1.2 mm x 0.6 mm)

VCNT2025X01



Automotive Qualified Reflective Sensor
(2.5 mm x 2.0 mm x 0.8 mm)



Pros:

Absolute position measurement,
flat profile, simple

Cons:

Each position needs one sensor

Conclusion

The adoption of optical sensor technologies in gear shift systems signifies a progressive step towards more sophisticated automotive mechanisms. Each type of sensor - transmissive, proximity, and reflective - brings unique advantages that enhance the functionality and reliability of gear shift operations. The three solutions above are examples, but are of course not limited to these exact functions. A combination of sensors and mechanical guides allow for more advanced functions.

Please reach out to our sales or technical support (sensorstechsupport@vishay.com) to discuss your ideas!