Standard Reflective Optoswitches

Notes On Using Reflective Switches

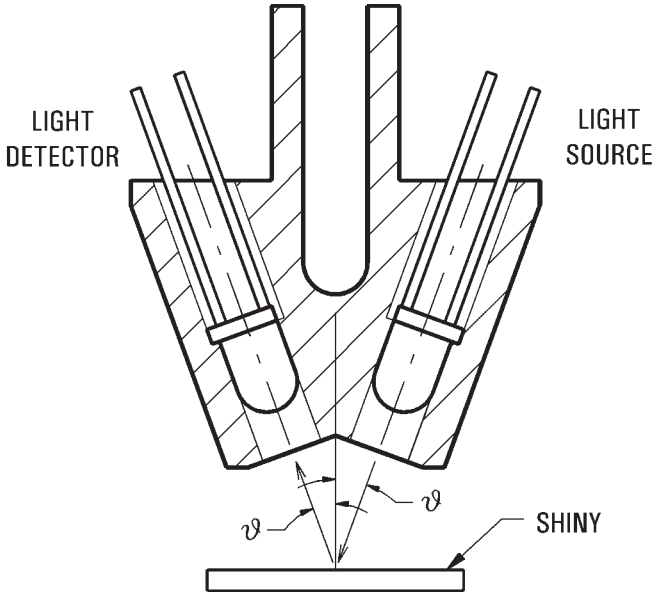
In its most basic form, a reflective optical switch (retro) consists of a housing which holds both a light source and a detector. Light from the lamp of LED radiates outward and is reflected back should an object be placed in front of the switch. The reflected light is sensed by the photodetector whose output signal changes accordingly.

There are a number of different types of reflective sensors. Designs vary depending upon the application. All have certain characteristics in common. How well they detect an object depends on:

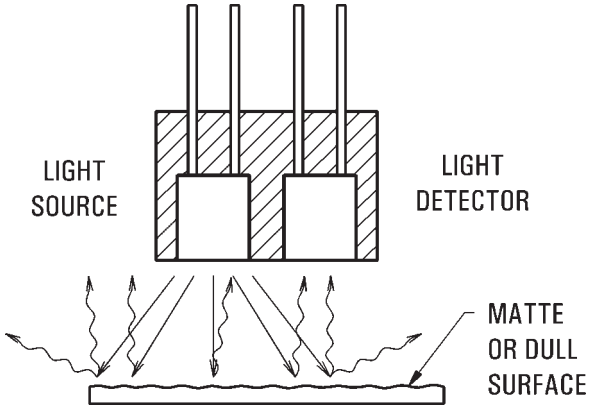
1. Amount of light emitted by the light source.
2. Sensitivity of the photodetector.
3. Distance between the switch and the object being sensed.
4. The light reflecting properties of the object.
5. Ambient lighting conditions.
6. The perpendicularity of the reflective surface to the switch.

When the object to be sensed has a polished surface, such as aluminum foil or mylar tape, often the best type of reflective switch to use is one which is designed to take advantage of the large amount of directly reflected light. This is done by mounting the emitter and detector such that their optical centers lie along the legs of an isosceles triangle such that the angle of the incidence of the emitter is equal to the angle of reflection.

When trying to sense matte objects (which do not have a highly polished surface, such as white paper), it is often possible to use a type of reflective switch optimized for sensing diffuse reflected light. Such devices have the emitter and detector mounted parallel to each other within the switch housing.



Sensor Used with a Specular Reflectance Surface.



Sensor Used with a Diffuse Reflectance Surface.

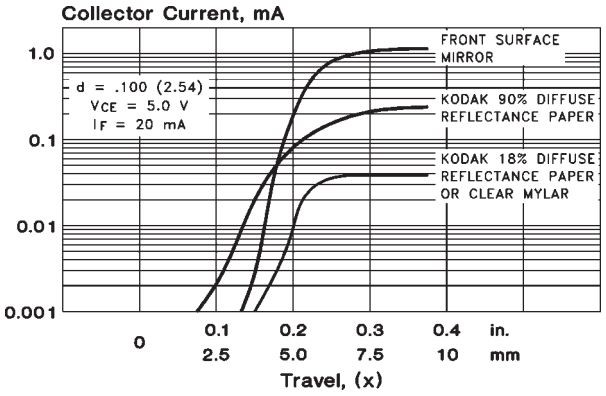
Since triangulation is not necessary, the emitter and detector elements can be located very close to each other. This allows for a much smaller package than is usually possible for retros designed to sense specularly reflected light. A retro designed to sense diffused reflected light can be the answer when space is at a premium.

Standard Reflective Optoswitches

Typical Performance Curves For VTR16 & VTR17 Arrow Retros

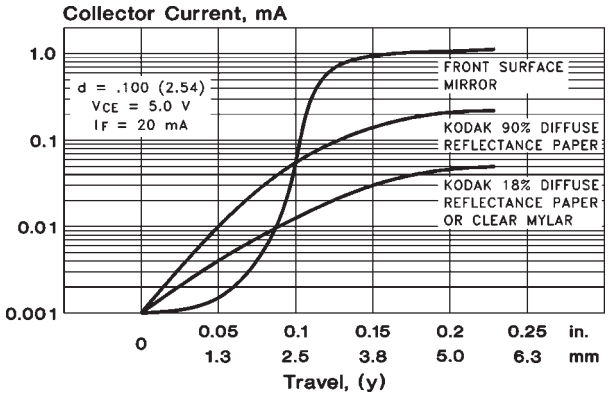
Output Current vs. Position

(Refer To Test Method No. 2 Below)

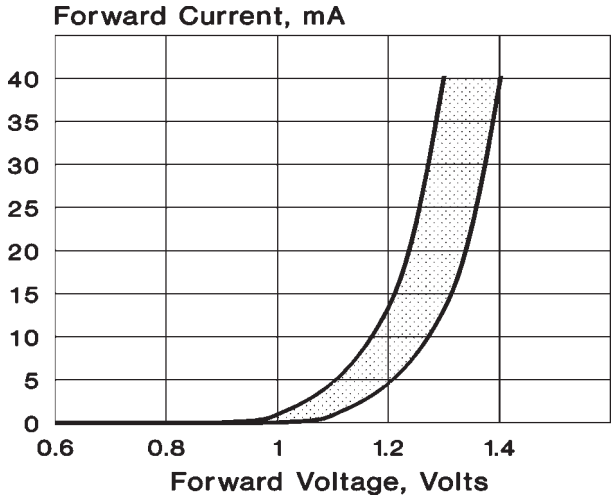


Output Current vs. Position

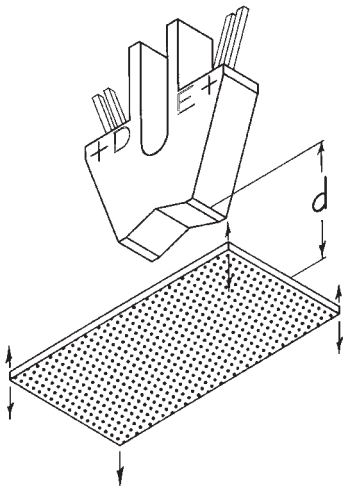
(Refer To Test Method No. 3 Below)



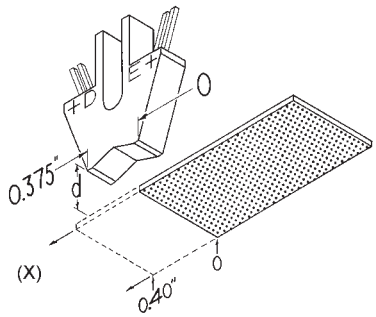
LED Forward Voltage Drop



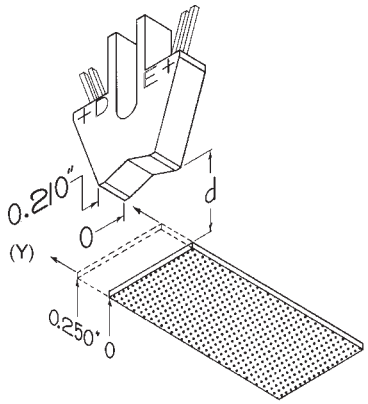
Test Method No. 1



Test Method No. 2



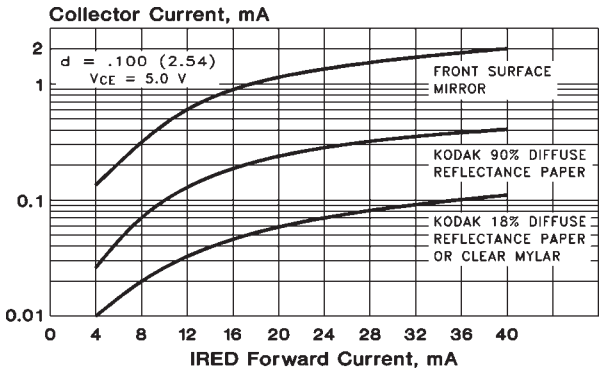
Test Method No. 3



Typical Performance Curves (cont.)

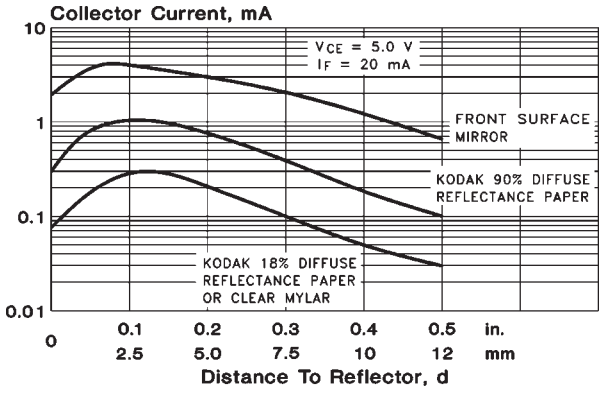
LED/Phototransistor Sensors

Output vs. Input Current



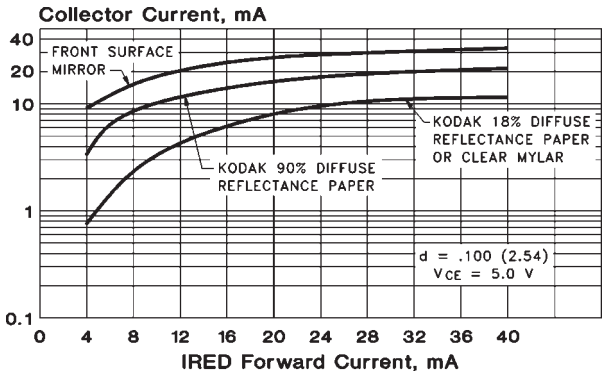
Output Current vs. Distance

(Refer To Test Method No. 1, Page 20)



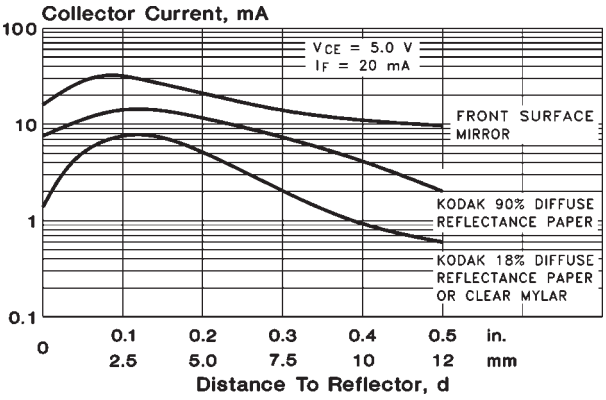
LED/Photodarlington Sensors

Output vs. Input Current



Output Current vs. Distance

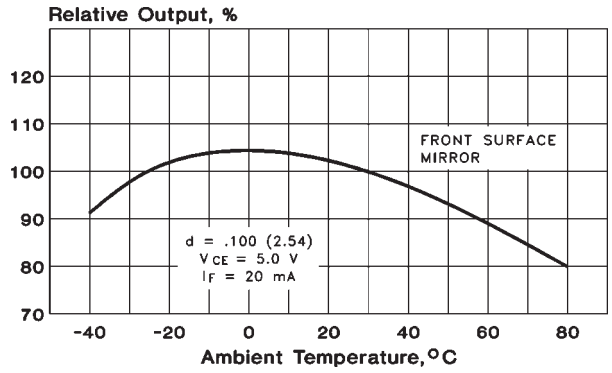
(Refer To Test Method No. 1, Page 20)



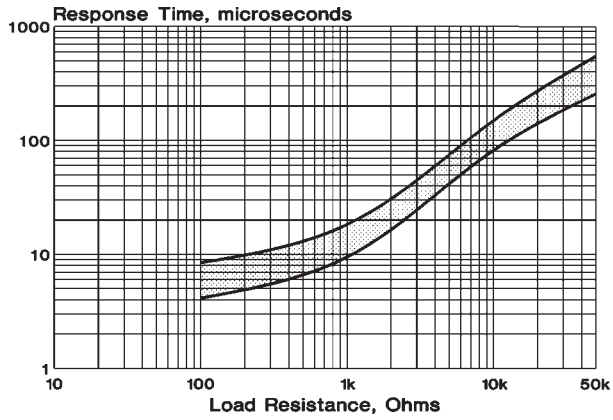
Typical Performance Curves (cont.)

LED/Phototransistor Sensors

Relative Output vs. Temperature

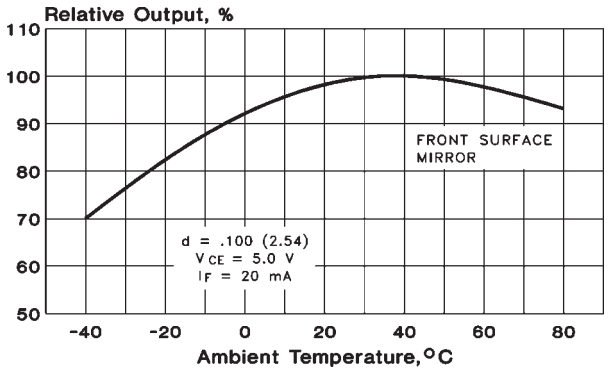


Response Time vs. Load Resistance



LED/Photodarlington Sensors

Relative Output vs. Temperature



Response Time vs. Load Resistance