# Plastic Silicon OPTOLOGIC Photosensor

# QSE257, QSE259

SIDELOOKER OPTOLOGIC
CASE 100CL

## Description

The QSE25x family are OPTOLOGIC ICs which feature a Schmitt trigger at output which provides hysteresis for noise immunity and pulse shaping. The basic building block of this IC consists of a photodiode, a linear amplifier, voltage regulator, Schmitt trigger and four output options. The TTL/LSTTL compatible output can drive up to ten TTL loads over supply currents from 4.5 to 16.0 Volts. The devices are marked with a color stripe for easy identification.

## Features

- Bipolar Silicon IC
- Package Type: Sidelooker
- Medium Wide Reception Angle, 50°
- Package Material and Color: Black Epoxy
- Daylight Filter
- High Sensitivity
- Direct TTL/LSTTL Interface
- These are Pb−Free Devices

## Block Diagrams

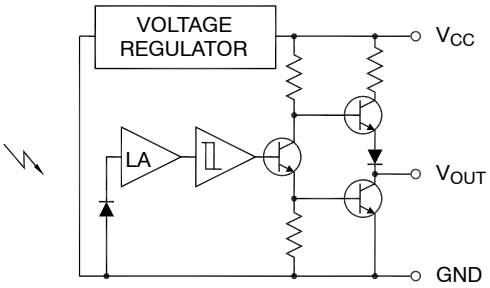



**Figure 1. QSE257 Totem−Pole Output Inverter**

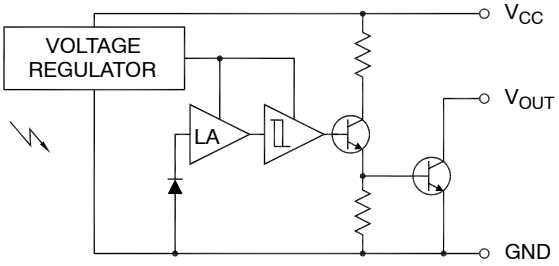



**Figure 2. QSE259 Open−Collector Output Inverter**

## INPUT/OUTPUT TABLE

| Part Number | Light | Output |
|---|---|---|
| QSE257 | On | LOW |
| | Off | HIGH |
| QSE259 | On | LOW |
| | Off | HIGH |

## ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

**MAXIMUM RATINGS** ($T_A$ = 25°C unless otherwise specified)

| Symbol | Parameter | Rating | Unit |
|---|---|---|---|
| $T_{OPR}$ | Operating Temperature | −40 to +85 | °C |
| $T_{STG}$ | Storage Temperature | −40 to +100 | °C |
| $T_{SOL-I}$ | Soldering Temperature (Iron) (Notes 2, 3, 4) | 240 for 5 s | °C |
| $T_{SOL-F}$ | Soldering Temperature (Flow) (Notes 2, 3) | 260 for 10 s | °C |
| $I_O$ | Output Current | 50 | mA |
| $V_{CC}$ | Supply Voltage | 4.0 to 16 | V |
| $V_O$ | Output Voltage | 35 | V |
| $P_D$ | Power Dissipation (Note 1) | 100 | mW |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Derate power dissipation linearly 2.50 mW/°C above 25°C.
2. RMA flux is recommended.
3. Methanol or isopropyl alcohols are recommended as cleaning agents.
4. Soldering iron 1/16” (1.6 mm) minimum from housing.

**ELECTRICAL CHARACTERISTICS** ($T_A$ = −40°C to +85°C, $V_{CC}$ = 4.5 V to 5.5 V)

| Symbol | Parameter | Test Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Ee(+) | Positive Going Threshold Irradiance (Note 5) | $T_A$ = 25°C | 0.025 | – | 0.250 | mW/cm$^2$ |
| Ee(+) / Ee(−) | Hysteresis Ratio | | 1.10 | – | 2.00 | |
| $I_{CC}$ | Supply Current (Note 5) | Ee = 0 or 0.3 mW/cm$^2$ | – | – | 5.0 | mA |
| | Peak to Peak Ripple which will Cause False Triggering | f = DC to 50 MHz | – | – | 2.00 | V |
| **QSE257 (INVERTER TOTEM POLE)** | | | | | | |
| $V_{OH}$ | High Level Output Voltage | Ee = 0, $I_{OH}$ = −10 mA | 2.4 | – | – | V |
| $V_{OL}$ | Low Level Output Voltage (Note 5) | Ee = 0.3 mW/cm$^2$, $I_{OL}$ = 16 mA | – | – | 0.40 | V |
| **QSE259 (INVERTER OPEN COLLECTOR)** | | | | | | |
| $I_{OH}$ | High Level Output Voltage | Ee = 0, $V_{OH}$ = 30 V | – | – | 100 | μA |
| $V_{OL}$ | Low Level Output Voltage (Note 5) | Ee = 0.3 mW/cm$^2$, $I_{OL}$ = 16 mA | – | – | 0.40 | V |
| **QSE257** | | | | | | |
| $t_R$, $t_F$ | Output Rise, Fall Times | Ee = 0 or 0.3 mW/cm$^2$, f = 10 kHz, DC = 50%, $R_L$ = 360 Ω (Note 5) | – | – | 70 | ns |
| $t_{PHL}$, $t_{PLH}$ | Propagation Delay | | – | 6.0 | – | μs |
| **QSE259** | | | | | | |
| $t_R$, $t_F$ | Output Rise, Fall Times | Ee = 0 or 0.3 mW/cm$^2$, f = 10 kHz, DC = 50%, $R_L$ = 360 Ω (Note 5) | – | – | 100 | ns |
| $t_{PHL}$, $t_{PLH}$ | Propagation Delay | | – | 6.0 | – | μs |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

5. λ = 880 nm (AlGaAs).

## TYPICAL PERFORMANCE CURVES

(Sensor Coupled to QEE113 Emitter)

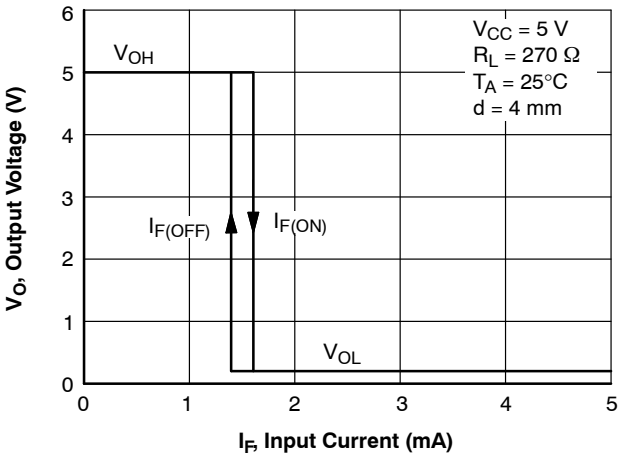



**Figure 3. Output Voltage vs. Input Current**

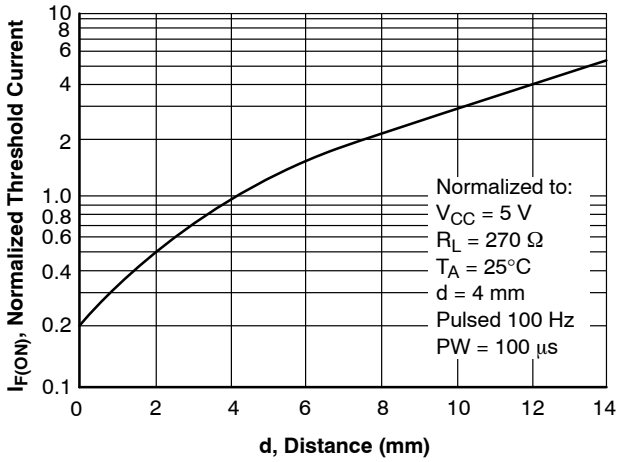



**Figure 4. Threshold Current vs. Distance**

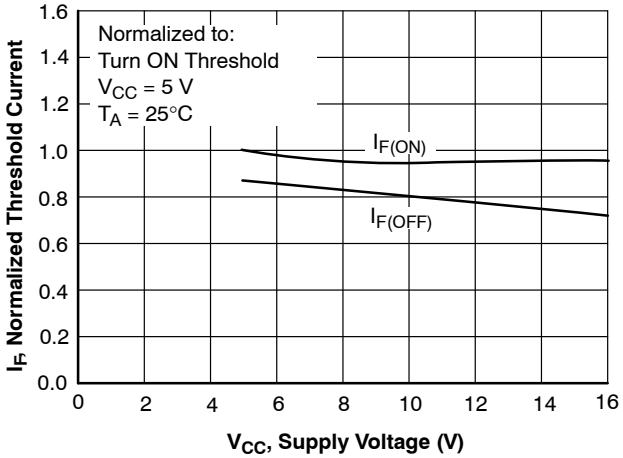



**Figure 5. Normalized Threshold Current vs. Supply Voltage**

## TYPICAL PERFORMANCE CURVES (continued)

(Sensor Coupled to QEE113 Emitter)

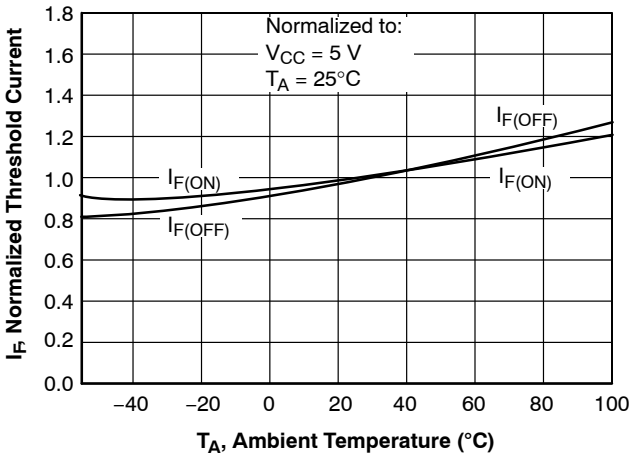



**Figure 6. Normalized Threshold Current vs. Ambient Temperature**

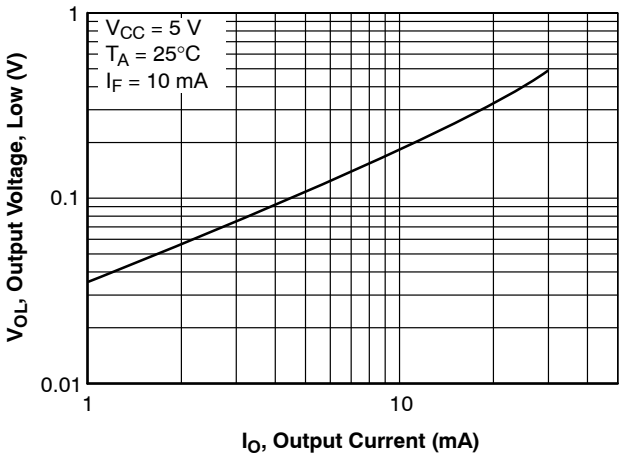



**Figure 7. Low Output Voltage vs. Output Current**

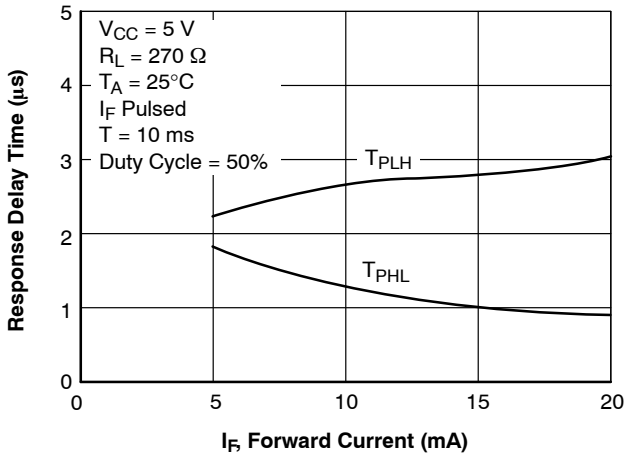
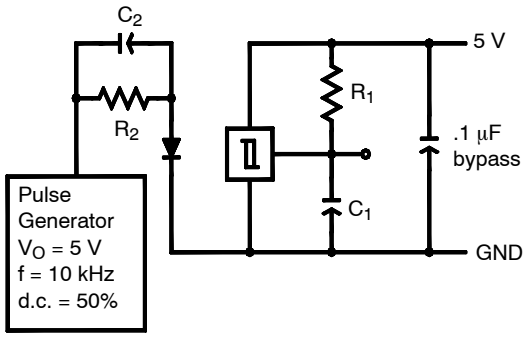



**Figure 8. Response Time vs. Forward Current**




$R_1$ = 360 Ω
$R_2$ = 180 Ω

$C_1$ = 15 pF
$C_2$ = 20 pF

$C_1$ and $C_2$ include probe and stray wire capacitance

**Figure 9. Switching Speed Test Circuit**

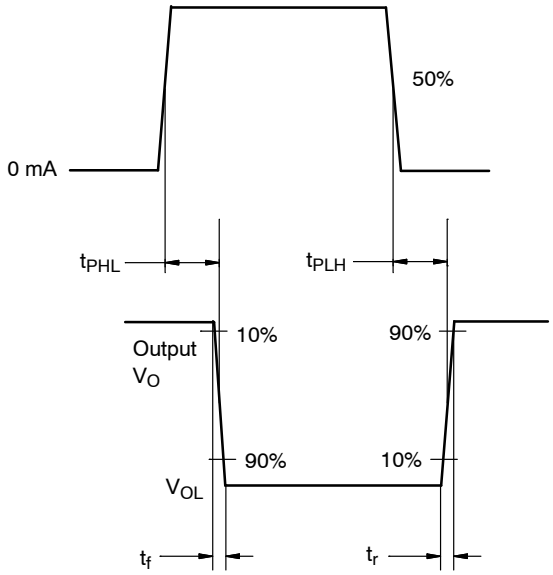



**Figure 10. Switching Times Definitions**

## ORDERING INFORMATION

| Part Number | Package | Part Number Definitions | Color Code | Shipping |
|---|---|---|---|---|
| QSE257 | SIDELOOKER OPTOLOGIC (Pb−Free) | Totem−Pole, inverter output | Yellow | 500 Units / Bulk |
| QSE259 | | Open−collector, inverter output | Blue | |

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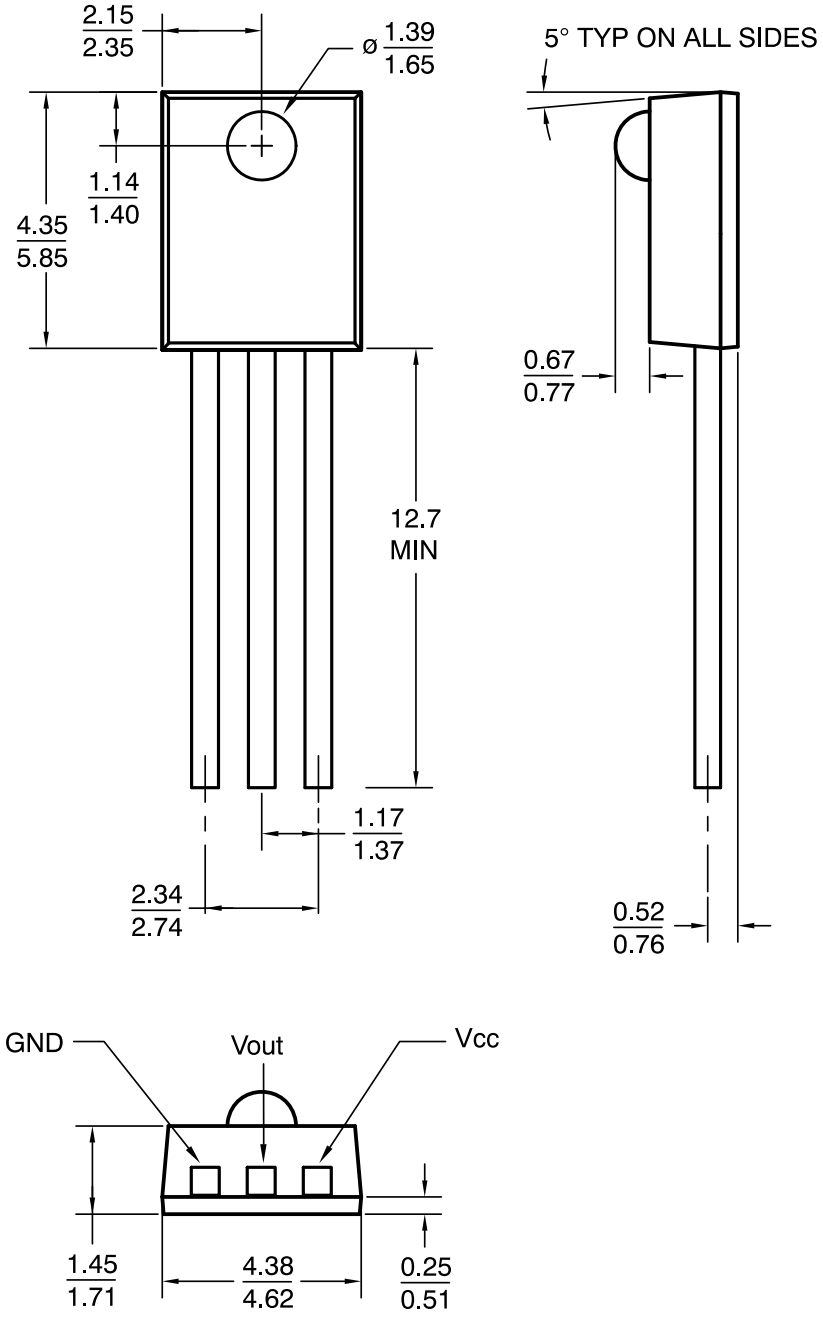


**Note:**

1. Dimensions for all drawings are in millimeters.

| | | |
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