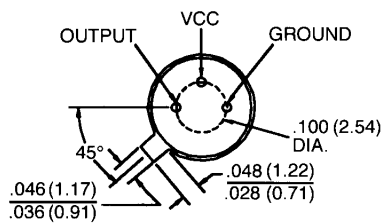
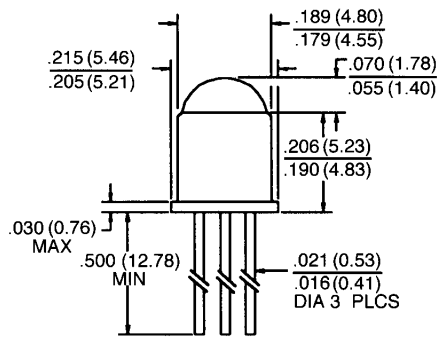


QSA156/157/158/159

PACKAGE DIMENSIONS



ST2139

DESCRIPTION

The QSA15X 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 monolithic die is packaged in a narrow angle, hermetically sealed, TO-18 metal can package.

FEATURES

- High noise immunity.
- Direct TTL/LSTTL interface.
- Hermetically sealed package.
- Reception angle of $\pm 12^\circ$.

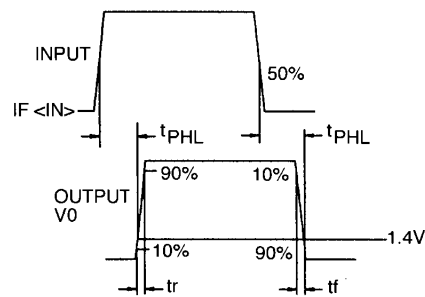
| ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ Unless Otherwise Specified) | |
|--|---|
| Supply Voltage, V_{CC} | 18 volts |
| Storage Temperature | -65°C to $+125^\circ\text{C}$ |
| Operating Temperature | -55°C to $+105^\circ\text{C}$ |
| Soldering: | |
| Lead Temperature (Iron) | 240°C for 5 sec. ^(2,3,4,5) |
| Lead Temperature (Flow) | 260°C for 10 sec. ^(2,3,5) |
| Power Dissipation | 250 mW ⁽¹⁾ |
| Duration of Output short to V_{CC} | 1.00 sec. |
| Voltage at Output | 35 volts |
| Sinking Current | 50 mA |
| Sourcing Current (QSA156, QSA157) | 10 mA |
| Irradiance | 3.0 mW/cm^2 |

| ELECTRICAL CHARACTERISTICS ($T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$) ($V_{CC} = 4.5$ to 16 volts) | | | | | | |
|---|-------------|----------------|------|-------|------------------|--|
| PARAMETER | SYMBOL | MIN. | TYP. | MAX. | UNITS | TEST CONDITIONS |
| Operating Supply Voltage | V_{CC} | 4.5 | | 16.0 | V | |
| Positive Going Threshold Irradiance ⁽⁶⁾ | Ee (+) | 0.025 | | 0.250 | mW/cm^2 | $T_A = 25^\circ\text{C}$ |
| Hysteresis Ratio | Ee(+)/Ee(-) | 1.10 | | 2.00 | | |
| Supply Current | I_{CC} | — | | 12.0 | mA | Ee = 0 or $.3 \text{ mW/cm}^2$ ⁽⁶⁾ |
| Peak to peak ripple which will cause false triggering | | — | | 2.00 | V | f = DC to 50 MHz |
| QSA156 (BUFFER TOTEM POLE) | | | | | | |
| High Level Output Voltage | V_{OH} | $V_{CC} - 2.1$ | | — | V | Ee = $.3 \text{ mW/cm}^2$, $I_{OH} = -1.0 \text{ mA}$ ⁽⁶⁾ |
| Low Level Output Voltage | V_{OL} | — | | 0.40 | V | Ee = 0, $I_{OL} = 16 \text{ mA}$ |
| QSA157 (INVERTER TOTEM POLE) | | | | | | |
| High Level Output Voltage | V_{OH} | $V_{CC} - 2.1$ | | — | V | Ee = 0, $I_{OH} = -1.0 \text{ mA}$ |
| Low Level Output Voltage | V_{OL} | — | | 0.40 | V | Ee = $.3 \text{ mW/cm}^2$, $I_{OL} = 16 \text{ mA}$ ⁽⁶⁾ |
| QSA158 (BUFFER OPEN COLLECTOR) | | | | | | |
| High Level Output Current | I_{OH} | — | | 100 | μA | Ee = $.3 \text{ mW/cm}^2$, $V_{OH} = 30 \text{ V}$ ⁽⁶⁾ |
| Low Level Output Voltage | V_{OL} | — | | 0.40 | V | Ee = 0, $I_{OL} = 16 \text{ mA}$ |
| QSA159 (INVERTER OPEN COLLECTOR) | | | | | | |
| High Level Output Current | I_{OH} | — | | 100 | μA | Ee = 0, $V_{OH} = 30 \text{ V}$ |
| Low Level Output Voltage | V_{OL} | — | | 0.40 | V | Ee = $.3 \text{ mW/cm}^2$, $I_{OL} = 16 \text{ mA}$ ⁽⁶⁾ |

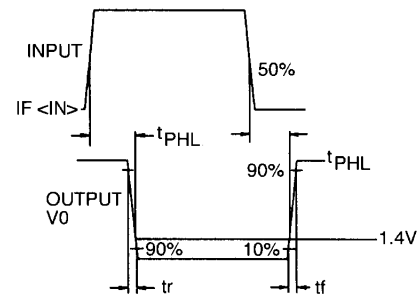
ELECTRICAL CHARACTERISTICS ($T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$)
($V_{CC} = 4.5$ to 16 volts)

| PARAMETER | SYMBOL | MIN. | TYP. | MAX. | UNITS | TEST CONDITIONS |
|-------------------------|--------------------|------|------|------|---------------|---|
| QSA156, QSA157 | | | | | | |
| Output rise, fall times | t_r, t_f | — | | 70 | nS | $E_e = 0$ or $.3 \text{ mW/cm}^2$, $f = 10\text{K HZ}$ |
| Propagation delay | t_{phl}, t_{plh} | | 6.0 | | μS | DC=50%, $R_L = 10 \text{ TTL loads}$ |
| QSA158, QSA159 | | | | | | |
| Output rise, fall times | t_r, t_f | — | | 100 | nS | $E_e = 0$ or $.3 \text{ mW/cm}^2$, $f = 10\text{K HZ}$ |
| Propagation delay | t_{phl}, t_{plh} | | 6.0 | | μS | DC=50%, $R_L = 300\Omega^{(6)}$ |

Switching Test Curve For Buffers



Switching Test Curve For Inverters

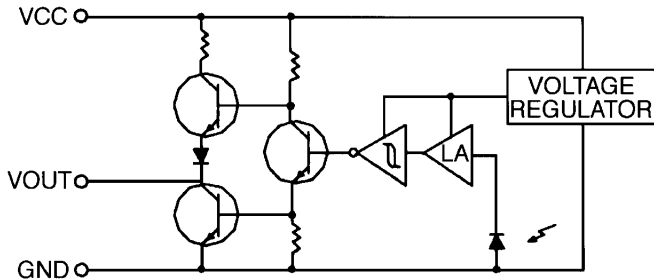


ST2141

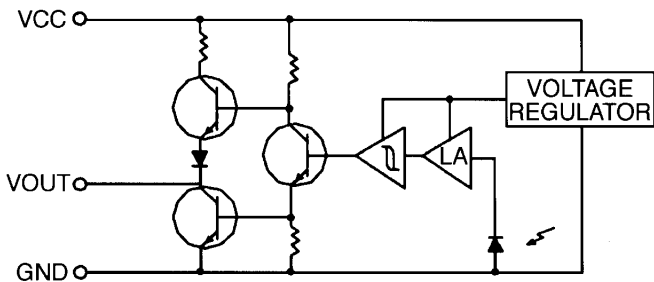
NOTES

1. Derate power dissipation linearly $2.50 \text{ mW}/^{\circ}\text{C}$ above 25°C .
2. RMA flux is recommended.
3. Methanol or Isopropyl alcohols are recommended as cleaning agents.
4. Soldering iron tip $1/16"$ (1.6 mm) minimum from housing.
5. As long as leads are not under any stress or spring tension.
6. Irradiance measurements are made with an AlGaAs LED emitting light at a peak wavelength of 880 nm.

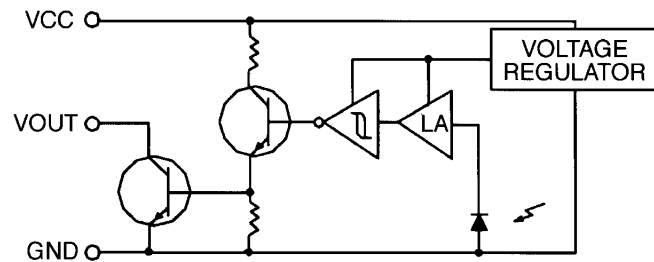
CIRCUIT SCHEMATICS



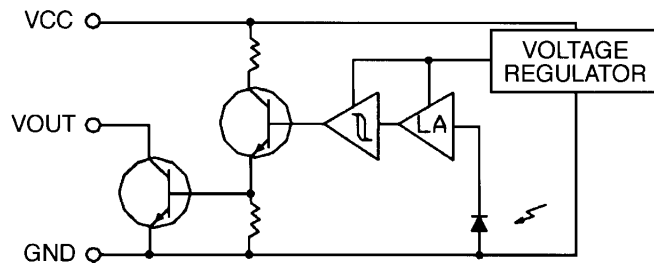
QSA156
Totem-Pole Output Buffer



QSA157
Totem-Pole Output Inverter



QSA158
Open-Collector Output Buffer



QSA159
Open-Collector Output Inverter

ST2140

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