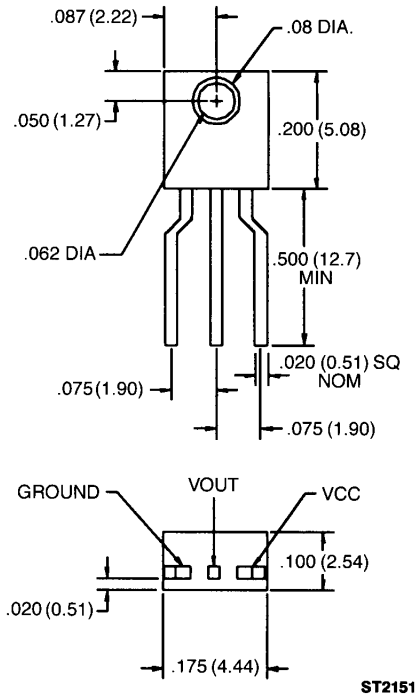
FAIRCHILD
SEMICONDUCTOR™

OPTOLOGIC™

QSE156/157/158/159

PACKAGE DIMENSIONS



ST2151

NOTES:
1. DIMENSIONS ARE IN INCHES (mm).
2. TOLERANCE IS ±.010 (.25)
   UNLESS OTHERWISE SPECIFIED.

DESCRIPTION

The QSE15X 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 dark red epoxy packaging system is designed to optimize the mechanical resolution, coupling efficiency, cost, and reliability.

FEATURES

- High noise immunity.
- Direct TTL/LSTTL interface.
- Steel lead frames for improved solder mounting.
- Reception angle of ±25°.

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ABSOLUTE MAXIMUM RATINGS (T_A = 25°C Unless Otherwise Specified)

Supply Voltage, V_{CC}	18 volts
Storage Temperature	−40°C + 100°C
Operating Temperature	−40°C to + 85°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	100 mW[1]
Duration of Output short to V_{CC}	1.00 sec.
Voltage at Output	35 volts
Sinking Current	50 mA
Sourcing Current (QSE156, QSE157)	10 mA
Irradiance	3.0 mW/cm²

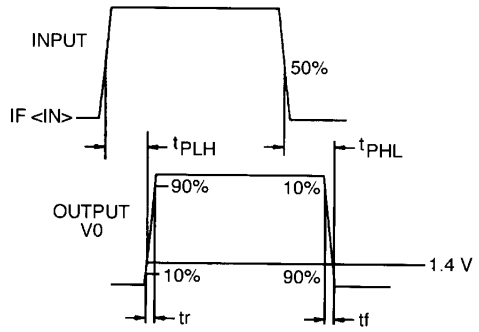
ELECTRICAL CHARACTERISTICS (T_A = −40°C to +85°C) (V_{CC} = 4.5 to 16 volts)

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/cm²	T_A = 25°C
Hysteresis Ratio	Ee(+)/Ee(−)	1.10		2.00		
Supply Current	I_{CC}	—		12.0	mA	Ee = 0 or .3 mW/cm² [6]
Peak to peak ripple which will cause false triggering		—		2.00	V	f = DC to 50 MHZ
QSE156 (BUFFER TOTEM POLE)						
High Level Output Voltage	V_{OH}	V_{CC}−2.1		—	V	Ee = .3 mW/cm², I_{OH} = −1.0 mA[6]
Low Level Output Voltage	V_{OL}	—		0.40	V	Ee = 0, I_{OL} = 16 mA
QSE157 (INVERTER TOTEM POLE)						
High Level Output Voltage	V_OH	V_{CC}−2.1		—	V	Ee = 0, I_{OH} = −1.0 mA
Low Level Output Voltage	V_{OL}	—		0.40	V	Ee = .3 mW/cm², I_{OL} = 16 mA[6]
QSE158 (BUFFER OPEN COLLECTOR)						
High Level Output Current	I_{OH}	—		100	μA	Ee = .3 mW/cm², V_{OH} = 30 V[6]
Low Level Output Voltage	V_{OL}	—		0.40	V	Ee = 0, I_{OL} = 16 mA
QSE159 (INVERTER OPEN COLLECTOR)						
High Level Output Current	I_{OH}	—		100	μA	Ee = 0, V_{OH} = 30 V
Low Level Output Voltage	V_{OL}	—		0.40	V	Ee = .3 mW/cm², I_{OL} = 16 mA [6]

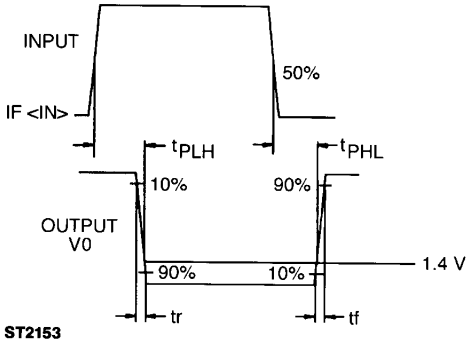
ELECTRICAL CHARACTERISTICS (T_A=−40°C to +85°C) (V_{CC}=4.5 to 16 volts)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
QSE156, QSE157						
Output rise, fall times	tr, tf	—		70	nS	Ee=0 or .3 mW/cm², f=10K Hz DC=50%, R_L=10 TTL loads[6]
Propagation delay	tphl, tplh		6.0		µS	
QSE158, QSE159						
Output rise, fall times	tr, tf	—		100	nS	Ee=0 or .3 mW/cm², f=10K Hz DC=50%, R_L=300Ω[6].
Propagation delay	tphl, tplh		6.0		µS	

Switching Test Curve for Buffers



Switching Test Curve for Inverters



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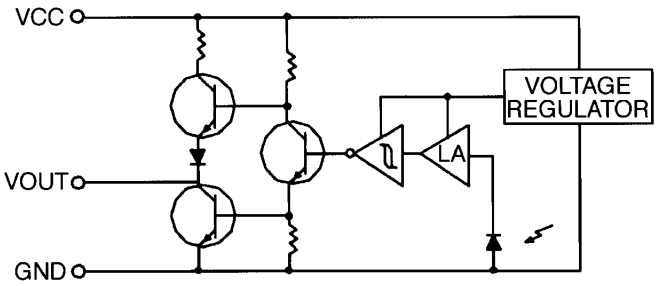
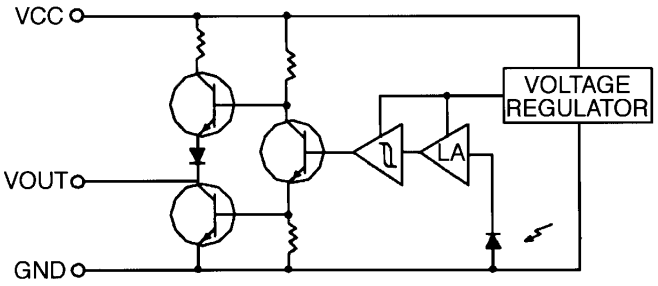
NOTES

1. *Derate power dissipation linearly 4.00 mW/°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.*

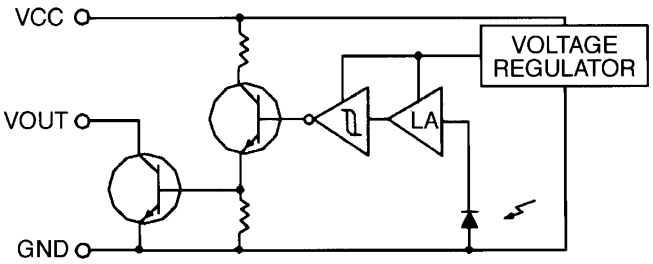
CIRCUIT SCHEMATICS



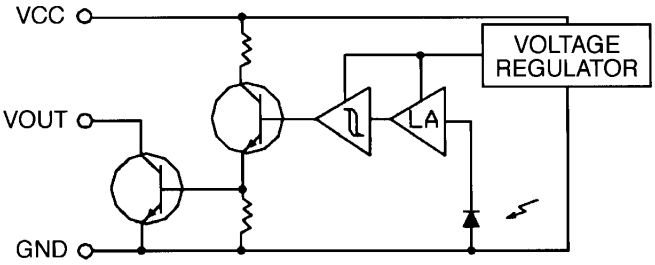
QSE156
Totem-Pole Output Buffer



QSE157
Totem-Pole Output Inverter



QSE158
Open-Collector Output Buffer



QSE159
Open-Collector Output Inverter

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2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.