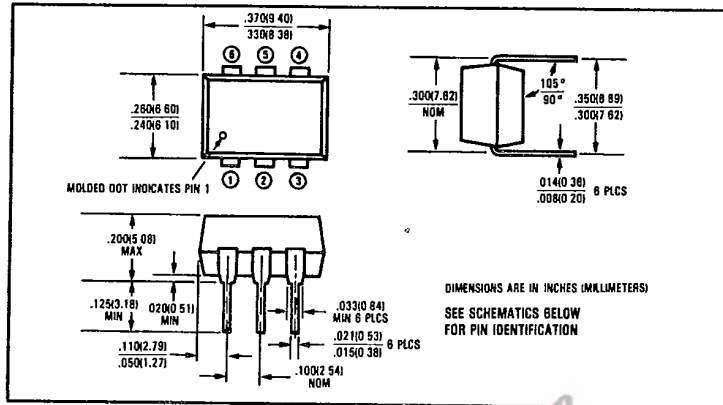
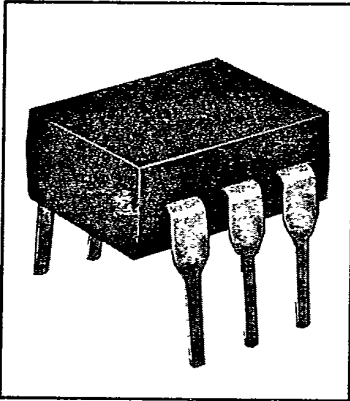




T-41-89

Photologic™ Optically Coupled Isolators

Types OPI8012, OPI8013, OPI8014, OPI8015



Features

- Four output options
- Low cost P-DIP package
- Direct TTL/STTL interface
- High noise immunity
- Data rates to 250 KBaud
- UL recognized File No. E58730

Description

The OPI8012, OPI8013, OPI8014, and OPI8015 each contain a gallium arsenide infrared emitting diode coupled to a monolithic integrated circuit which incorporates a photodiode, a linear amplifier and a Schmitt trigger on a single silicon chip. The devices feature TTL/STTL compatible logic level output which can drive up to 8 TTL loads directly without additional circuitry. Also featured are medium speed data rates to 250 KBaud and typical rise and fall times of 25 nsec. The devices are designed for industrial environments and have built-in hysteresis for high immunity to noise on input and VCC.

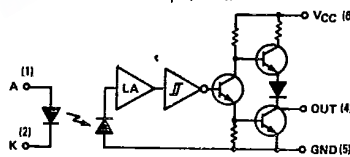
Absolute Maximum Ratings (TA = 25°C unless otherwise noted)

Input-to-Output Isolation Voltage	1500 V Peak ⁽¹⁾
Supply Voltage, VCC	+10 V
Storage Temperature Range	-55°C to +150°C
Operating Temperature Range	-55°C to +100°C
Lead Soldering Temperature (1/16 inch [1.6 mm] from case for 5 sec. with soldering iron) ⁽²⁾	260°C
Total Device Power Dissipation	250 mW ⁽³⁾
Input Diode Power Dissipation	100 mW ⁽⁴⁾
Output Photologic Power Dissipation	200 mW ⁽⁵⁾
Duration of Output Short to VCC or Ground (OPI8012, OPI8014)	1.00 sec.
Duration of Output Short to VCC (OPI8013, OPI8015)	1.00 sec.
Voltage at Output Lead (OPI8013, OPI8015)	.35 V
Diode Input { Forward D.C. Current	.25 mA
{ Reverse D.C. Voltage	3.0 V

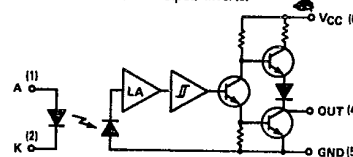
Notes: (1) Measured with input diode leads shorted together and output leads shorted together. (2) RMA flux is recommended. Duration can be extended to 10 seconds max. when flow soldering. (3) Derate linearly 3.33 mW/cm² above 25°C. (4) Derate linearly 1.33 mW/cm² above 25°C. (5) Derate linearly 2.67 mW/cm² above 25°C.

Schematics

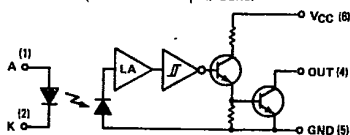
OPI8012 (Totem-Pole Output) Buffer



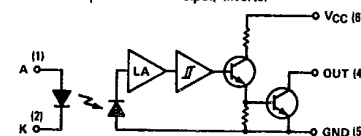
OPI8014 (Totem-Pole Output) Inverter



OPI8013 (Open-Collector Output) Buffer



OPI8015 (Open-Collector Output) Inverter



Types OPI8012, OPI8013, OPI8014, OPI8015

T-41-89

Electrical Characteristics (-40°C to +70°C unless otherwise noted)

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
--------	-----------	------	------	------	-------	-----------------

Diode Input

V _F	Forward Voltage			1.50	V	I _F = 10.0 mA, T _A = 25°C
I _R	Reverse Current			10.0	μA	V _R = 3.0 V, T _A = 25°C
I _{F(+)}	LED Positive-Going Threshold Current			10.0	mA	V _{CC} = 5.0 V,
I _{F(+)} /I _{F(-)}	Hysteresis Ratio		2.0			

Photologic™ Output

V _{CC}	Operating Supply Voltage	4.8		5.2	V	
I _{CC}	Supply Current			15.0	mA	V _{CC} = 5.2 V, I _F = 0 or 10.0 mA

OPI8012 (Buffer, Totem-Pole)

V _{OL}	Low Level Output Voltage			0.40	V	V _{CC} = 4.8 V, I _{OL} = 13 mA, I _F = 0 mA
V _{OH}	High Level Output Voltage	2.4			V	V _{CC} = 4.8 V, I _{OH} = -800 μA, I _F = 10.0 mA
I _{OS}	Short Circuit Output Current	-30		-100	mA	V _{CC} = 5.2 V, I _F = 10.0 mA, Output = GND

OPI8013 (Buffer, Open-Collector)

V _{OL}	Low Level Output Voltage			0.40	V	V _{CC} = 4.8 V, I _{OL} = 13 mA, I _F = 0 mA
I _{OH}	High Level Output Current			100	μA	V _{CC} = 4.8 V, V _{OH} = 30 V, I _F = 10.0 mA

OPI8014 (Inverter, Totem-Pole)

V _{OL}	Low Level Output Voltage			0.40	V	V _{CC} = 4.8 V, I _{OL} = 13 mA, I _F = 10.0 mA
V _{OH}	High Level Output Voltage	2.4			V	V _{CC} = 4.8 V, I _{OH} = -800 μA, I _F = 0 mA
I _{OS}	Short Circuit Output Current	-30		-100	mA	V _{CC} = 5.2 V, I _F = 0 mA, Output = GND

OPI8015 (Inverter, Open-Collector)

V _{OL}	Low Level Output Voltage			0.40	V	V _{CC} = 4.8 V, I _{OL} = 13 mA, I _F = 10.0 mA
I _{OH}	High Level Output Current			100	μA	V _{CC} = 4.8 V, V _{OH} = 30 V, I _F = 0 mA

OPI8012, OPI8014

t _r , t _f	Output Rise Time, Output Fall Time			25	ns	V _{CC} = 5.0 V, T _A = 25°C, I _F = 10.0 mA, Square Wave f = 10.0 kHz, D.C. = 50%, R _L = 8 TTL Loads
t _{PLH} , t _{PHL}	Propagation Delay, Low-High, High-Low			10.0	μs	

OPI8013, OPI8015

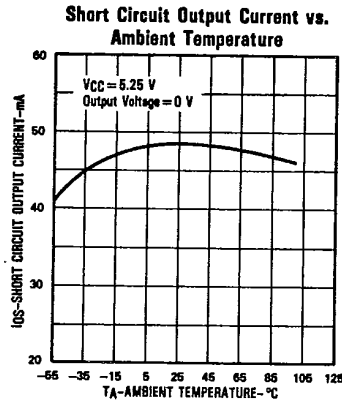
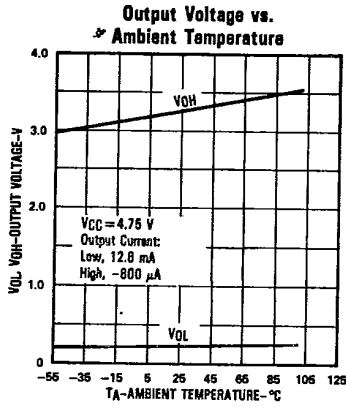
t _r , t _f	Output Rise Time, Output Fall Time			25	ns	V _{CC} = 5.0 V, T _A = 25°C, I _F = 10.0 mA, Square Wave f = 10.0 kHz, D.C. = 50%, R _L = 360 Ω
t _{PLH} , t _{PHL}	Propagation Delay, Low-High, High-Low			10.0	μs	

Types OPI8012, OPI8013, OPI8014, OPI8015

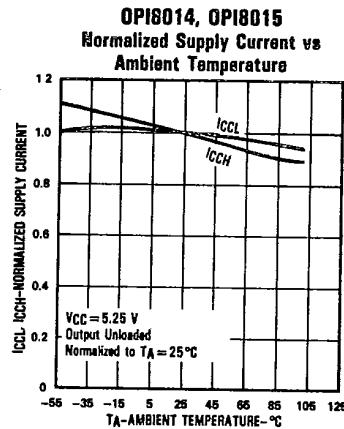
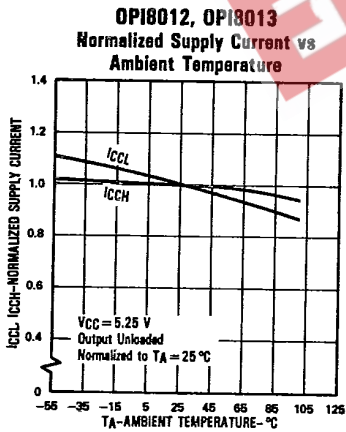
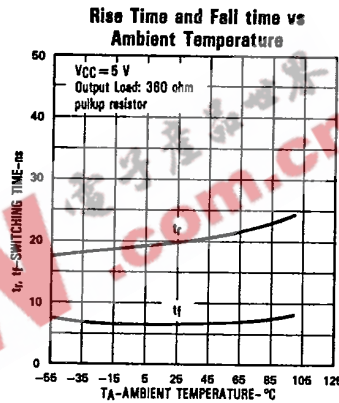
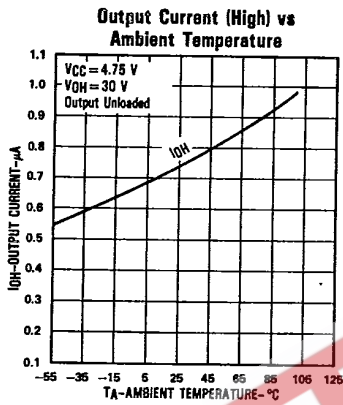
T-41-89

Typical Performance Curves

OPI8012, OPI8014



OPI8013, OPI8015

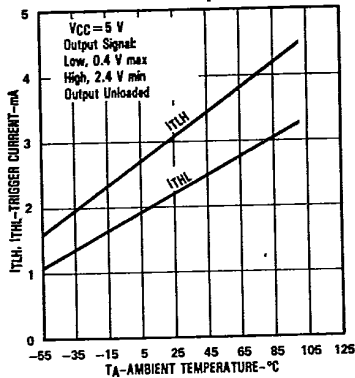


Types OPI8012, OPI8013, OPI8014, OPI8015

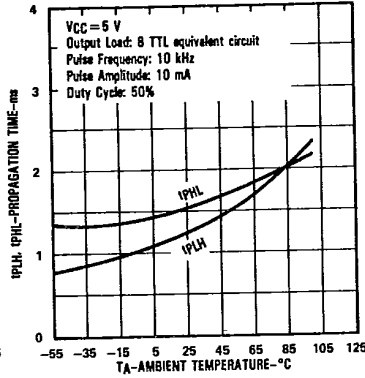
T-41-89

Typical Performance Curves

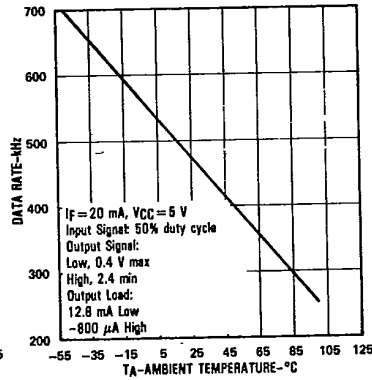
Trigger Current vs Ambient Temperature



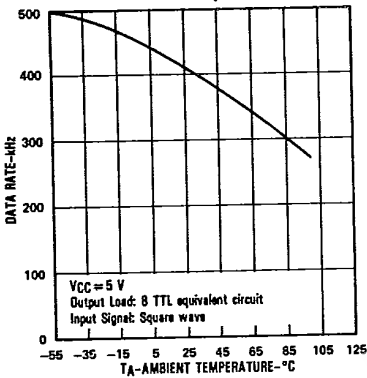
Propagation Time vs Ambient Temperature



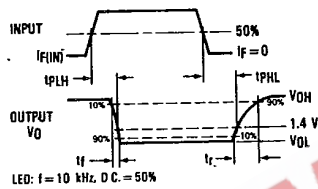
Data Rate vs Ambient Temperature



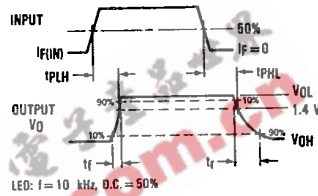
Data Rate vs Ambient Temperature



Switching Test Curve for Inverters



Switching Test Curve for Buffers



TRW reserves the right to make changes at any time in order to improve design and to supply the best product possible. Plastic color may vary.
 Optoelectronics Division, TRW Electronic Components Group, 1215 W. Crosby Rd., Carrollton, TX 75006 (214) 323-2200, TLX 6716032 or 216849
 © TRW Inc. 1985. TRW is the name and mark of TRW Inc. Printed in U.S.A.