

T-41-73

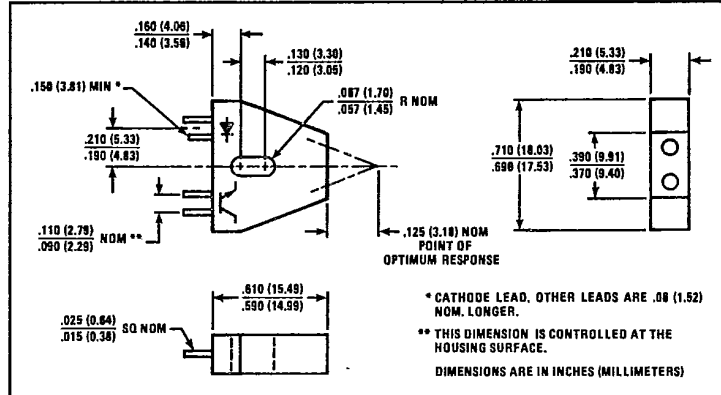
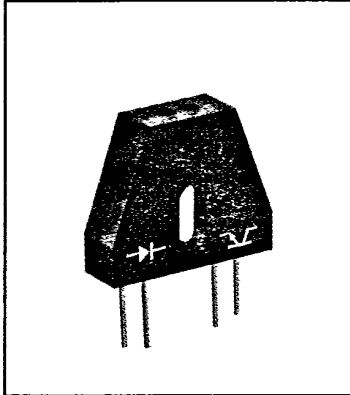


Optoelectronics Division
TRW Electronic Components Group

Product Bulletin 5288
January 1985

Reflective Object Sensors

Types OPB708, OPB709



Features

- Focused for maximum sensitivity
- Phototransistor (OPB708) or photodarlington (OPB709) output
- Crosstalk does not exceed specified I_{CEQ}
- Low cost plastic housing

Description

The OPB708 and OPB709 each consists of an infrared emitting diode and an NPN silicon phototransistor (OPB708) or photodarlington (OPB709) mounted side-by-side on converging optical axes, in a black plastic housing. Maximum sensitivity typically occurs .125 in. from the front of the housing. Housing material is flame retardant ABS which meets UL 94V-0 standards. The photosensor responds to radiation from the LED only when a reflective object passes within its field of view.

Both parts are constructed using either OP160 or OP260 series LEDs. The OPB708 utilizes an OP500 type phototransistor and the OPB709 uses an OP530 type photodarlington.

Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Storage Temperature Range	.....	-40°C to $+85^\circ\text{C}$
Operating Temperature Range	.....	-40°C to $+85^\circ\text{C}$
Lead Soldering Temperature (1/16 inch [1.6 mm] from case for 5 sec. with soldering iron)	.....	$240^\circ\text{C}^{(1)}$

Input Diode

Reverse Voltage	.....	2.0 V
Continuous Forward Current	.....	40 mA
Power Dissipation	.....	60 mW ⁽²⁾

Output Photosensor

Collector-Emitter Voltage — OPB708	.....	30 V
OPB709	.....	15.0 V
Emitter-Collector Voltage	.....	5.0 V
Power Dissipation — OPB708	.....	50 mW ⁽³⁾
OPB709	.....	125 mW ⁽⁴⁾

Notes:

- (1) RMA flux is recommended. Duration can be extended to 10 sec. max. when flow soldering.
- (2) Derate linearly 1.09 mW/°C above 25°C.
- (3) Derate linearly 0.91 mW/°C above 25°C.
- (4) Derate linearly 2.27 mW/°C above 25°C.
- (5) d is the distance from the assembly face to the reflective surface.
- (6) Reflective surface is Eastman Kodak neutral white test card with 90% diffuse reflectance as a reflecting surface.
- (7) Lower curve is based on a calculated worst case condition rather than the conventional -2σ limit.

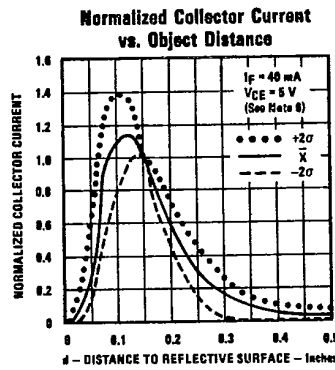
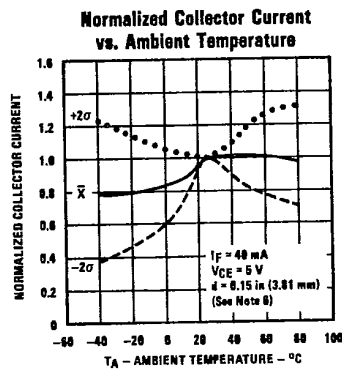
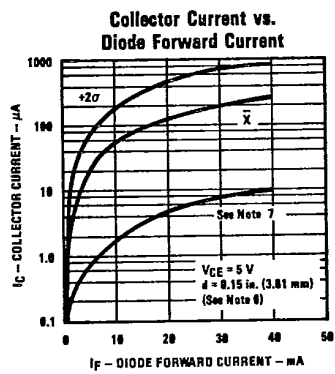
Type OPB708

T-41-73

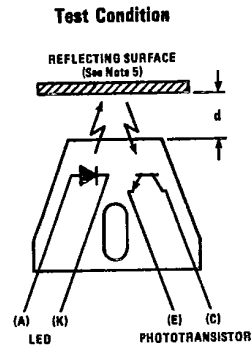
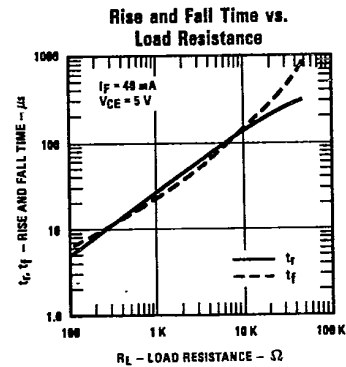
Electrical Characteristics (TA = 25°C unless otherwise noted)

Symbol	Parameter	Min.	Max.	Units	Test Conditions
Input Diode					
V _F	Forward Voltage		1.70	V	I _F = 40 mA
I _R	Reverse Current		100	μA	V _R = 2.0 V
Output Phototransistor					
V _{BR} (CEO)	Collector-Emitter Breakdown Voltage	30		V	I _C = 100 μA
V _{BR} (ECO)	Emitter-Collector Breakdown Voltage	5.0		V	I _E = 100 μA
I _{CEO}	Collector Dark Current		100	nA	V _{CE} = 10.0 V, I _F = 0, E _B = 0
Combined					
I _C (ON)	On-State Collector Current	10.0		μA	V _{CE} = 5.0 V, I _F = 40 mA, d = 0.150" (3.81 mm) ^{5/8B}
V _{CE} (SAT)	Collector-Emitter Saturation Voltage		0.40	V	I _F = 40 mA, I _C = 3.0 μA, d = 0.150" (3.81 mm) ^{5/8B}

Typical Performance Curves



G



Type OPB709

T-41-73

Electrical Characteristics (T_A = 25°C unless otherwise noted)

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

Input Diode

V _F	Forward Voltage		1.70	V	I _F = 40 mA
I _R	Reverse Current		100	μA	V _R = 2.0 V

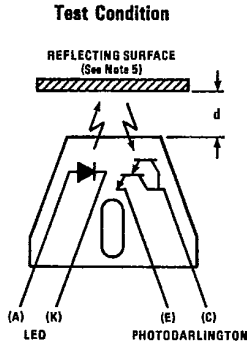
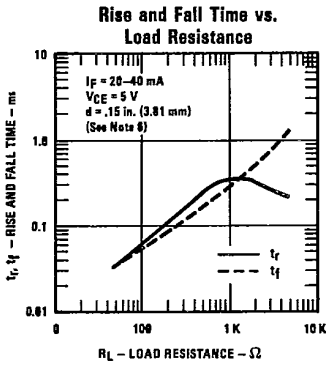
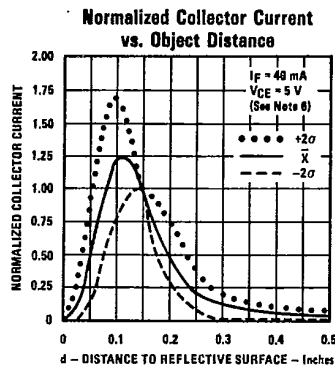
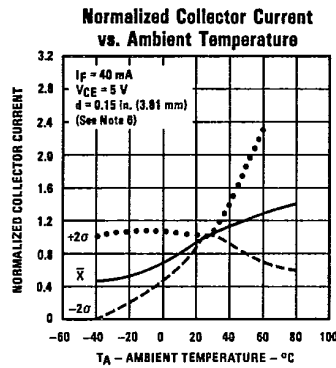
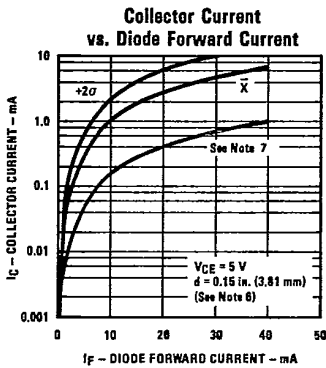
Output Photodarlington

V _{(BR)CEO}	Collector-Emitter Breakdown Voltage	15.0		V	I _C = 100 μA
V _{(BR)ECO}	Emitter-Collector Breakdown Voltage	5.0		V	I _E = 100 μA
I _{CEO}	Collector Dark Current		250	nA	V _{CE} = 10.0 V, I _F = 0, E _B = 0

Combined

I _{C(ON)}	On-State Collector Current	1.00		mA	V _{CE} = 5.0 V, I _F = 40 mA, d = 0.150" (3.81 mm) ⁽⁵⁾⁽⁶⁾
V _{CE(SAT)}	Collector-Emitter Saturation Voltage		1.10	V	I _F = 40 mA, I _C = 3.0 μA, d = 0.150" (3.81 mm) ⁽⁵⁾⁽⁶⁾

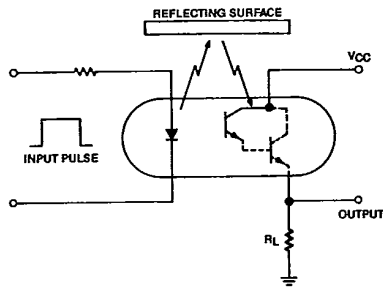
Typical Performance Curves



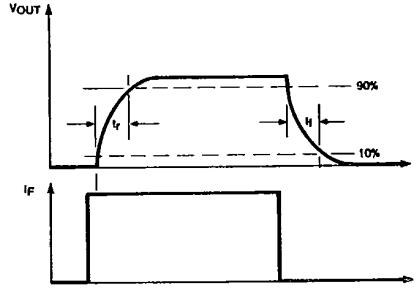
Types OPB708, OPB709

T-41-73

Response Time Test Circuit

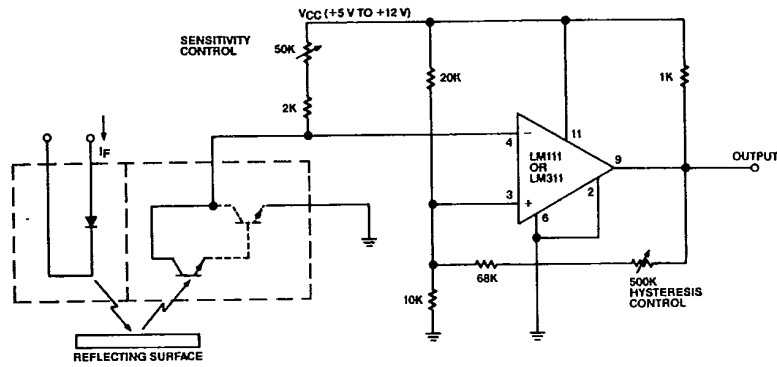


Switching Time Waveforms



Typical Interfacing Circuit

Recommended for applications requiring adjustments on both sensitivity and hysteresis.



TRW assumes no responsibility for use of any circuits shown and makes no representation that they are free from patent infringement.

TRW reserves the right to make changes at any time in order to improve design and to supply the best product possible.

Optoelectronics Division, TRW Electronic Components Group, 1215 W. Crosby Rd., Carrollton, TX 75006 (214) 323-2200, TLX 6716032 or 215849
 © TRW Inc. 1985, 1982. TRW is the name and mark of TRW Inc. Printed in U.S.A.