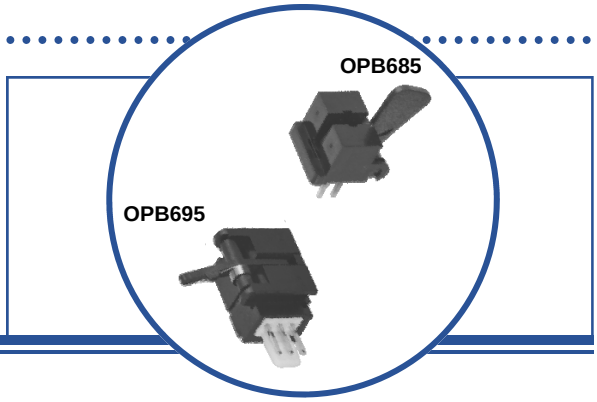
Photologic® Optical Flag Switch
OPB685, OPB685-3, OPB686, OPB687, OPB688
OPB695, OPB696, OPB697, OPB698 Series

TT electronics
OPTEK Technology

Features:

- Photologic® output
- Four output options
- Mechanical switch replacement
- Printed circuit board mounting (OPB685 Series)
- 2.5mm, 3-pin connector mates with Molex connector 5051 series housing and 4809 series terminal for OPB695 Series



Description:

Each **OPB685** and **OPB695** series flag switch consists of an infrared emitting diode and a monolithic integrated circuit that incorporates a photodiode, a linear amplifier and a Schmitt trigger. A lever arm actuated flag interrupts the light beam, which switches the output between states that can readily drive logic gates.

The **OPB695** series is designed to easily snap mount into a 0.037" ± 0.001" (0.940 mm ± 0.025 mm) thick material with a rectangular opening of 0.320" ± 0.003" x 0.472" (8.13 mm x 11.99 mm) minimum. Insertion into the punched side of metal is recommended.

Devices in these series feature TTL/LSTTL compatible logic level output that can drive up to 10 TTL loads over a voltage range from 4.5 V to 16 V.

Customized lever arms and spring torques can be designed for specific applications for each of the devices.

Custom electrical, wire, cabling and connectors are available. Contact your local representative or OPTEK for more information.

Applications:

- Mechanical switch replacement
- Speed indication (tachometer)
- Mechanical limit indication
- Edge sensing

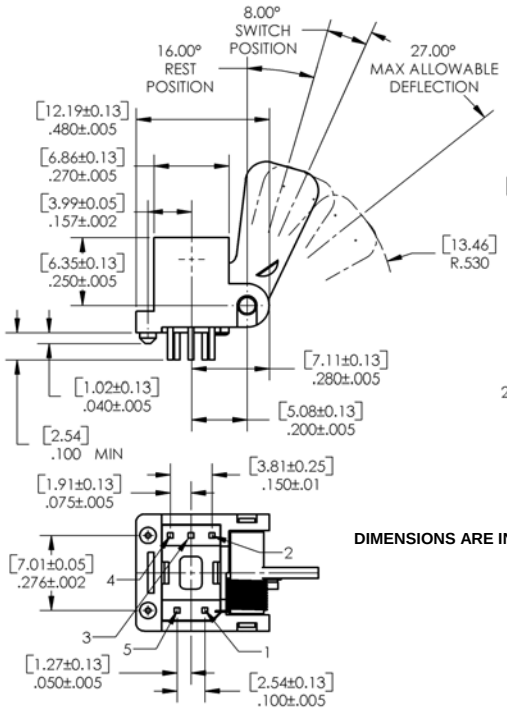
Ordering Information

Part Number	LED Peak Wavelength	Sensor Photologic®	Flag Travel Degrees Max	Lead Length / Spacing or Connector
OPB685	890 nm	10K Pull-Up	59°	0.100" / 0.275"
OPB686		Open Collector		
OPB687		Inv. 10K Pull-Up		
OPB688		Inv. Open Collector		
OPB695AZ		10K Pull-Up	70°	Mates with 3 Pin—Molex 5051 (22-01-1032) Housing & 4809 (08-70-0069) Terminals
OPB695BZ				
OPB695CZ				
OPB696AZ		Open Collector		
OPB696BZ				
OPB696CZ				
OPB697AZ		Inv. 10K Pull-Up		
OPB697BZ				
OPB697CZ				
OPB698AZ		Inv. Open Collector		
OPB698BZ				
OPB698CZ				

Pb
RoHS

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

OPB685, OPB685-3, OPB686, OPB687, OPB688



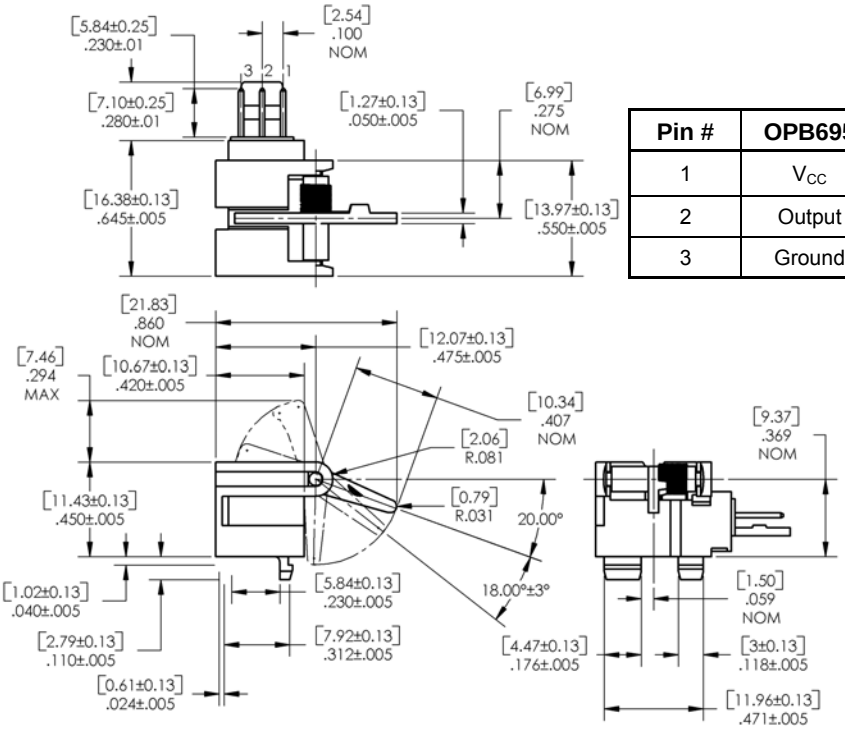
DIMENSIONS ARE IN: [MILLIMETERS] INCHES

Pin #	Description
1	Anode
5	Cathode
2	Ground
3	Output
4	V_{CC}

OPB695, OPB696, OPB697, OPB698

Part Number	Max. Torque (Grams)
OPB685	1.5
OPB685-3	3.0
OPB686	1.5
OPB687	1.5
OPB688	1.5
OPB695	1.5
OPB696	1.5
OPB697	1.5
OPB698	1.5

Torque is measured at the end of the arm from the resting position to the switching point of the flag



Pin #	OPB695
1	V_{CC}
2	Output
3	Ground

OPTEK Technology Inc. — 1645 Wallace Drive, Carrollton, Texas 75006
Phone: (972) 323-2200 or (800) 341-4747 FAX: (972) 323-2396 sensors@optekinc.com www.optekinc.com

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

Storage & Operating Temperature Range	-40°C to +100°C
Lead Soldering Temperature [1/16 inch (1.6mm) from the case for 5 sec. with soldering iron][1]	260°C

Input Diode

Reverse Voltage	2.0 V
Continuous Forward Current	50 mA
Peak Forward Current	3.0 A
Total Device Power Dissipation[2]	100 mW

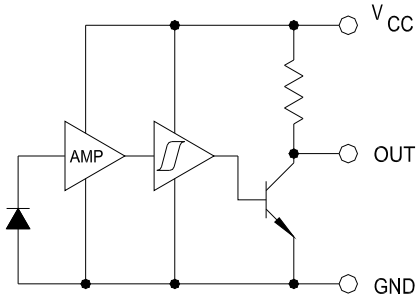
Output Photologic®

Supply Voltage, V_{CC}	18 V
Duration of Output Short to V_{CC}	1 second
Voltage at Output	30 V
Low Level Output Current (sinking)	16 mA
Power Dissipation[3] [4]	240 mW

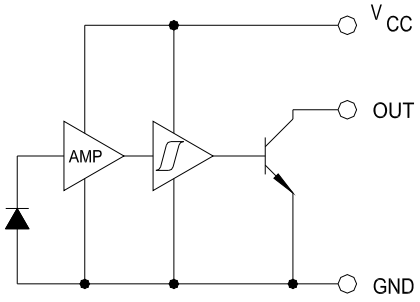
Notes:
(1) RMA flux is recommended. Duration can be extended to 10 seconds maximum when flow soldering.
(2) Derate linearly 1.33 mW/°C above 25° C.
(3) Derate linearly 2.00 mW/°C above 25° C (OPB680, OPB680-20, OPB690Z).
(4) Derate linearly 2.50 mW/°C above 25° C (OPB685, OPB686, OPB687, OPB688, OPB695, OPB696, OPB697, OPB698).

OPB685 and OPB695 Series

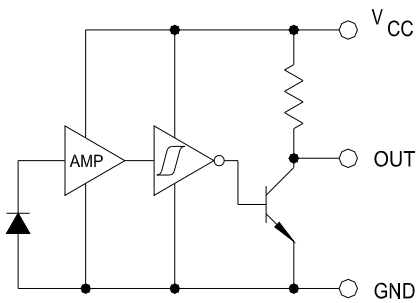
OPB685, OPB695 Buffered 10K Pull-Up



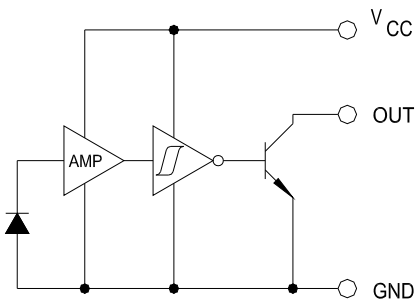
OPB686, OPB696 Buffered Open-Collector



OPB687, OPB697 Inverted 10K Pull-Up



OPB688, OPB698 Inverted Open-Collector



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

SYMBOL	PARAMETER		MIN	TYP	MAX	UNITS	TEST CONDITIONS
Input Diode							
V_F	Forward Voltage		-	-	1.6	V	I_F = 10 mA
I_R	Reverse Current		-	-	100	µA	V_R = 3 V
Output Photologic® Sensor							
V_{CC}	Operating DC Supply Voltage	OPB685 Series	4.5	-	16.0	V	
		OPB695-698A	4.5	5.0	8.0		
		OPB695-698B	8.0	12.0	13.5		
		OPB695-698C	13.5	15.0	16.0		
I_{CC}	Operating DC Supply Voltage OPB695-698A/B/C		-	20	30	mA	
I_{CCL}	Low Level Supply Current: Buffered 10k Pull-Up	OPB685	-	5.5	12	mA	V_{CC} = 16 V, I_F = 0 mA (no load on output)
	Buffered Open-Collector	OPB686	-	4.0	12		
	Inverted 10k Pull-Up	OPB687	-	6.5	12	mA	V_{CC} = 16 V, I_F = 10 mA (no load on output)
	Inverted Open-Collector	OPB688	-	5.0	12		
I_{CCH}	High Level Supply Current: Buffered 10k Pull-Up	OPB685	-	5.0	12	mA	V_{CC} = 16 V, I_F = 10 mA (no load on output)
	Buffered Open-Collector	OPB686					
	Inverted 10k Pull-Up	OPB687	-	4.0	12	mA	V_{CC} = 16 V, I_F = 0 mA (no load on output)
	Inverted Open-Collector	OPB688					
V_{OL}	Low Level Output Voltage: Buffered 10k Pull-Up	OPB685	-	-	0.4	V	V_{CC} = 4.5 V, I_{OL} = 16 mA, I_F = 0
		OPB686	-	-	0.4		V_{CC} = 4.5 V to 8 V, I_{OL} = 16 mA
	Buffered Open-Collector	OPB695	-	-	0.4		V_{CC} = 8.5 V to 13 V, I_{OL} = 16 mA
		OPB696A/B/C	-	-	0.4		V_{CC} = 13.5 V to 16 V, I_{OL} = 16 mA
	Inverted 10k Pull-Up	OPB685	-	-	0.4	V	V_{CC} = 4.5 V, I_{OL} = 16 mA, I_F = 0
		OPB686	-	-	0.4		V_{CC} = 4.5 V to 8 V, I_{OL} = 16 mA
	Inverted Open-Collector	OPB695	-	-	0.4		V_{CC} = 8.5 V to 13 V, I_{OL} = 16 mA
		OPB696A/B/C	-	-	0.4		V_{CC} = 13.5 V to 16 V, I_{OL} = 16 mA
V_{OH}	High Level Output Voltage: Buffered 10k Pull-Up		V_{CC} -1.5	-	-	V	I_{OH} = 100 µA, I_F = 10 mA
	Inverted 10k Pull-Up Inverted Open-Collector		V_{CC} -1.5	-	-	V	I_{OH} = 100 µA, I_F = 0 mA
I_{OH}	High Level Output Voltage: Buffered Open-Collector	OPB686	-	-	100	µA	V_{CC} = 16 V, I_F = 10 mA, V_{CH} = 30 V
		OPB696A	-	-	100		V_{CC} = 4.5 V to 8 V, V_{OH} = 30 V
		OPB696B	-	-	100		V_{CC} = 8.5 V to 13 V, V_{OH} = 30 V
		OPB696C	-	-	100		V_{CC} = 13.5 V to 16 V, V_{OH} = 30 V
	Inverted 10k Pull-Up	OPB688	-	-	100	µA	V_{CC} = 16 V, I_F = 10 mA, V_{CH} = 30 V(1)
		OPB698A	-	-	100		V_{CC} = 4.5 V to 8 V, V_{OH} = 30 V(1)
		OPB698B	-	-	100		V_{CC} = 8.5 V to 13 V, V_{OH} = 30 V(1)
		OPB698C	-	-	100		V_{CC} = 13.5 V to 16 V, V_{OH} = 30 V(1)

Notes:
(1) Test requires lever arm in “blocked” position.

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

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
Output Photologic® Sensor (continued)						
$I_{F(+)}$	LED Positive-Going Threshold Current OPB685-688	0.1	1.8	10	mA	V_{CC} = 5 V
$I_{F(+)}/I_{F(-)}$	Hysteresis OPB685/688	1.0	1.2	1.6	mA	V_{CC} = 5 V
$t_r t_f$	Rise Time, Fall Time	-	30	-	ns	V_{CC} = 5 V, I_F = 0 or 10 mA R_L = 300 Ω, DC = 50% f = 10 kHz
$t_{PLH} t_{PHL}$	Propagation Delay Low-High & High-Low: Buffer, 10k Pull-Up OPB685 Buffer, Open-Collector OPB686	 - -	 1 (LH) 2 (HL)	 - -	 µs µs	
	Inverter, 10k Pull-Up OPB687 Inverter, Open-Collector OPB688	- -	2 (LH) 1 (HL)	- -	µs µs	

Notes:
(1) Test requires lever arm in “blocked” position.