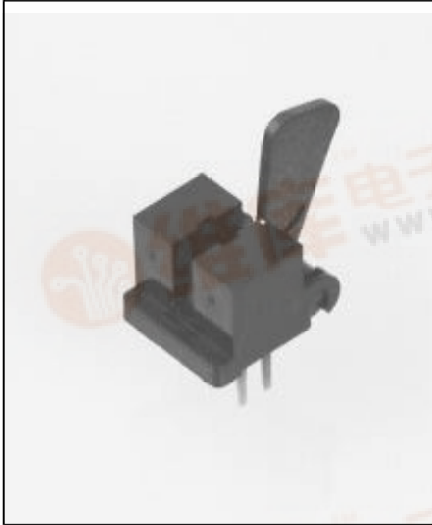




Product Bulletin OPB685
July 1996

Photologic[®] Optical Flag Switch

Types OPB685, OPB686, OPB687, OPB688



Features

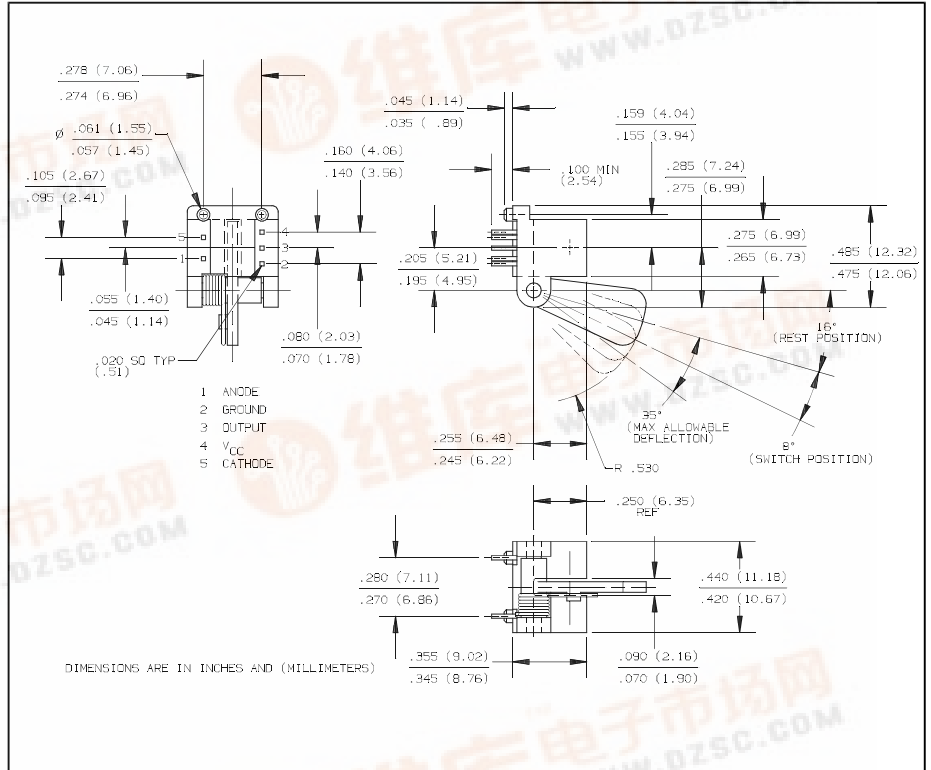
- Photologic[®] output
- Four output options
- Mechanical switch replacement
- Printed circuit board mounting

Description

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

Customized lever arms and spring torques can be designed for specific applications.

The device features TTL/LSTTL compatible logic level output which can drive up to 10 TTL loads over a voltage range from 4.5 V to 16 V.



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

Storage Temperature Range	-40° C to +100° C
Operating Temperature Range	-40° C to +100° C
Lead Soldering Temperature [1/16 inch (1.6 mm) from case for 5 sec. with soldering iron]	240° C

Input Diode

Forward DC Current	50 mA
Peak Forward Current (1μs pulse width, 300 pps)	3.0 A
Reverse DC Voltage	3.0 V
Power Dissipation	100 mW ⁽²⁾

Output Photologic[®]

Supply Voltage, V _{CC}	18 V
Duration of Output Short To V _{CC}	1.00 sec
Voltage at Output	30 V
Low Level Output Current (sinking)	16 mA
Power Dissipation	240 mW ⁽³⁾

Notes:

- (1) RMA flux is recommended. Duration can be extended to 10 sec. max. when flow soldering.
- (2) Derate linearly 1.33 mW/° C above 25° C.
- (3) Derate linearly 2.50 mW/° C above 30° C.



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Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
Input Diode						
V_F	Forward Voltage			1.6	V	$I_F = 10\text{ mA}$
I_R	Reverse Current			100	μA	$V_R = 3.0\text{ V}$
Output Photologic[®] Sensor						
V_{CC}	Operating D.C. Supply Voltage	4.5		16.0	V	
$I_F(+)$	LED Positive-Going Threshold Current	0.1	1.8	10.0	mA	$V_{CC} = 5.0\text{ V}$
$I_F(+)/I_F(-)$	Hysteresis Ratio	1.05	1.20	1.60		$V_{CC} = 5.0\text{ V}$
I_{CCH}	High Level Supply Current: Buffer, 10K Pull-up		5.0	12.0	mA	$V_{CC} = 16\text{ V}$, No Load On Output, $I_F = 10\text{ mA}$
	Buffer, Open-Collector	OPB685				
	Inverter, 10K Pull-up		4.0	12.0	mA	$V_{CC} = 16\text{ V}$, No Load On Output, $I_F = 0\text{ mA}$
	Inverter, Open-Collector	OPB686 OPB687 OPB688				
I_{CCL}	Low Level Supply Current: Buffer, 10K Pull-up		5.5	12.0	mA	$V_{CC} = 16\text{ V}$, No Load On Output, $I_F = 0\text{ mA}$
	Buffer, Open-Collector	OPB685				
	Inverter, 10K Pull-up	OPB686				
	Inverter, Open-Collector	OPB687 OPB688				
V_{OH}	High Level Output Voltage: Buffer, 10K Pull-up				V	$I_{OH} = 100\ \mu\text{A}$, $I_F = 10\text{ mA}$
	Inverter, 10K Pull-up	OPB685 OPB687	$(V_{CC}-1.5)^{(5)}$		V	
I_{OH}	High Level Output Current: Buffer, Open-Collector			100	μA	$V_{CC} = 16\text{ V}$, $V_{OH} = 30\text{ V}$, $I_F = 10\text{ mA}$
	Inverter, Open-Collector	OPB686 OPB688			μA	
V_{OL}	Low Level Output Voltage: Buffer, 10K Pull-up			0.4	V	$V_{CC} = 4.5\text{ V}$, $I_{OL} = 16\text{ mA}$, $I_F = 0\text{ mA}^{(4)}$
	Buffer, Open-Collector	OPB685				
	Inverter, 10K Pull-up	OPB686				
	Inverter, Open-Collector	OPB687 OPB688				
t_r, t_f	Output Rise Time, Output Fall Time		30		ns	$V_{CC} = 5\text{ V}$, $I_F = 0$ or 10 mA , $f = 10\text{ kHz}$, D.C. = 50%, $R_L = 300\ \Omega$
t_{PLH}	Propagation Delay, Low-High Buffer, 10K Pull-up		1.0		μs	
	Buffer, Open-Collector	OPB685				
	Inverter, 10K Pull-up Inverter, Open-Collector	OPB686 OPB687 OPB688		2.0	μs	
t_{PHL}	Propagation Delay, High-Low Buffer, 10K Pull-up		2.0		μs	
	Buffer, Open-Collector	OPB685				
	Inverter, 10K Pull-up	OPB686				
	Inverter, Open-Collector	OPB687 OPB688		1.0	μs	

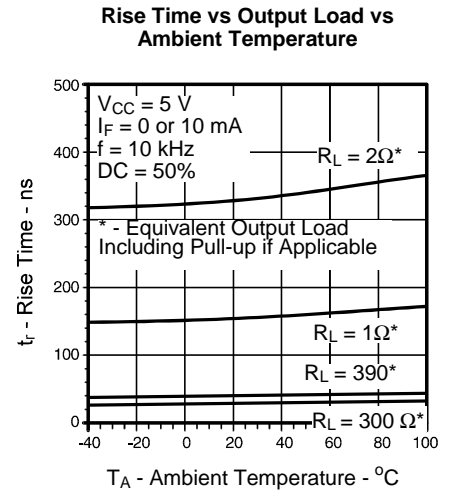
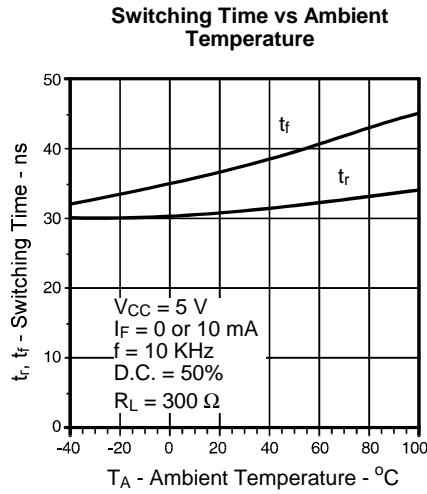
(4) Normal application would be with light source blocked, simulated by $I_F = 0\text{ mA}$.

(5) $V_{OH} = V_{CC}-1.5\text{ V}$ for $V_{CC} = 4.5\text{ V}$ to 16 V .

SLOTTED
OPTICAL
CONNECTOR

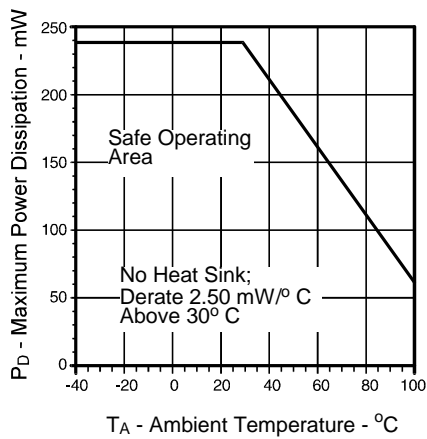
Types OPB685, OPB686, OPB687, OPB688

Typical Performance Curves

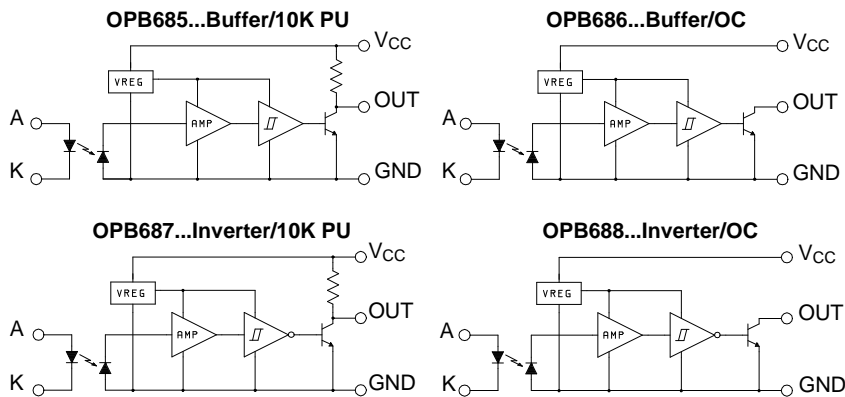


SLOTTED OPTICAL SWITCHES

Typical Thermal Derating Curve



Schematics

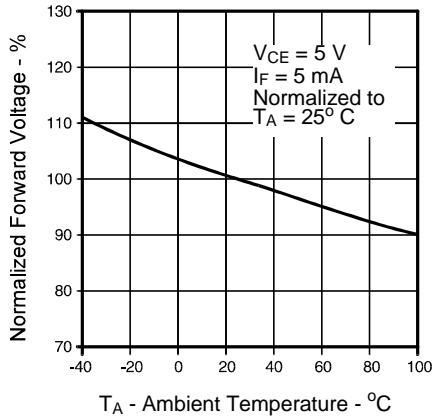


Types OPB685, OPB686, OPB687, OPB688

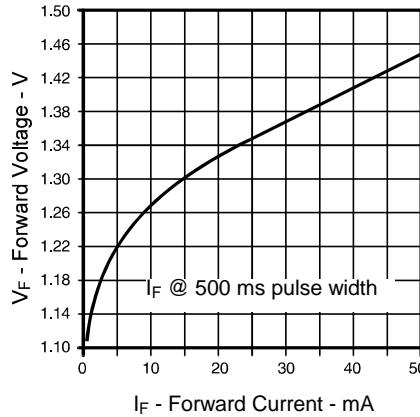


Typical Performance Curves

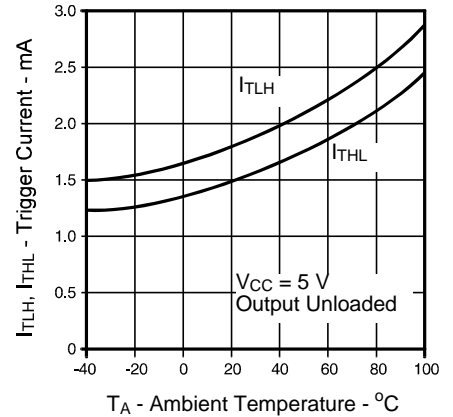
Normalized Forward Voltage vs Ambient Temperature



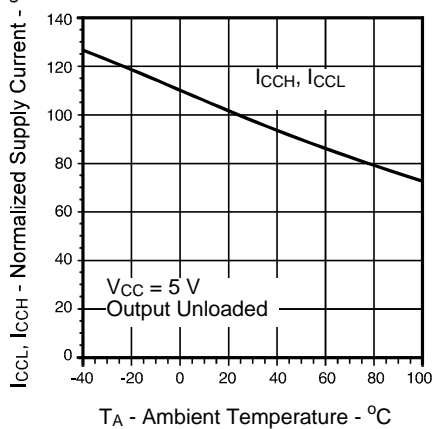
Forward Current vs Forward Voltage Input Diode



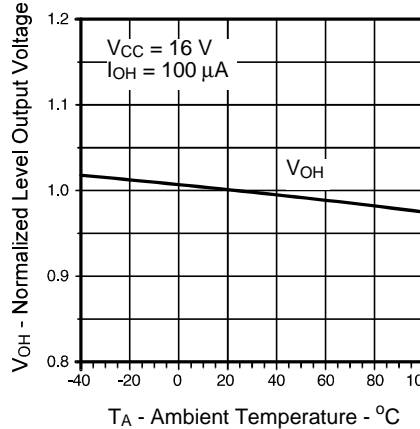
Trigger Current vs Ambient Temperature



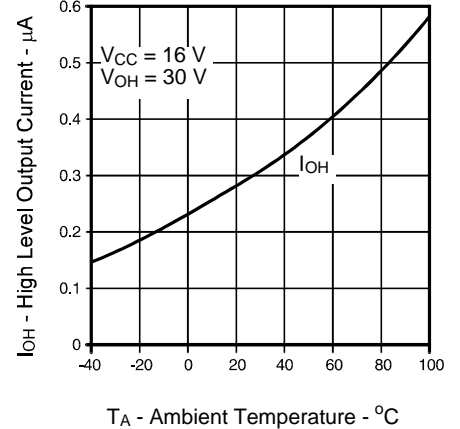
Normalized Supply Current vs Ambient Temperature



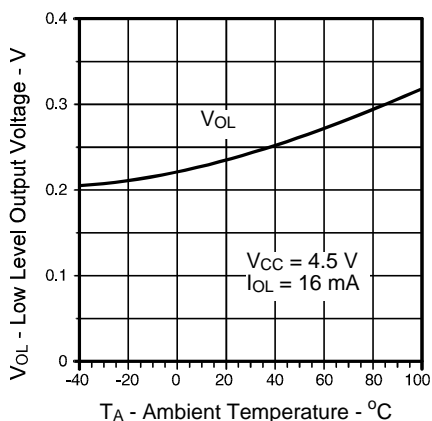
OPB685, OPB687 Normalized High Level Output Voltage vs Ambient Temperature



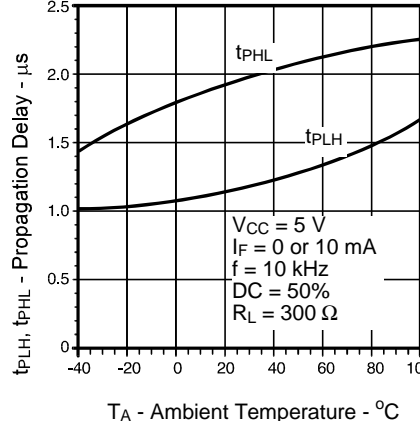
OPB686, OPB688 High Level Output Current vs Ambient Temperature



Low Level Output Voltage vs Ambient Temperature



OPB685, OPB686 Propagation Delay vs Ambient Temperature



OPB687, OPB688 Propagation Delay vs Ambient Temperature

