

# LED and Photosensor Pairs

OPS665, OPS666, OPS667, OPS691, OPS692, OPS693, OPS698



## Features:

- High current transfer ratio
- Low-cost plastic package
- Lateral side-looking clear plastic package (OPS691, OPS692, OPS693 and OPS698)



## Description:

Each LED/Photosensor pair in the series consists of a gallium arsenide infrared emitting diode and a NPN silicon phototransistor, mounted in a T-1 package (**OPS665, OPS666, OPS667**) or in a matched lateral side-looking plastic package (**OPS691, OPS692, OPS693 and OPS698**).

Matched pairs are desirable where the application is unique and the quantity required does not justify assembly tooling costs. If separation between the LED and sensor is greater than two times the specified  $IC_{(ON)}$  distance, proper alignment becomes critical. Although sold as pairs, emitters and sensors are packaged separately for handling ease.

Please note that the sensor is sensitive to ambient light.

## Applications:

- Non-contact reflective object sensor
- Assembly line automation
- Machine automation
- Machine safety
- End of travel sensor
- Door sensor

Ordering Information				
Part Number	Output	Package Style	Description	Lead Length
OPS665	Transistor	T-1	Gallium arsenide infrared emitting diode (OP165) NPN silicon phototransistor (OP505)	0.50" (1.700 mm)
OPS666	Transistor	T-1	Gallium arsenide infrared emitting diode (OP165) NPN silicon phototransistor (OP505)	0.50" (1.700 mm)
OPS667	Transistor	T-1	Gallium arsenide infrared emitting diode (OP165) NPN silicon phototransistor (OP505)	0.50" (1.700 mm)
OPS691	Transistor	Lateral Side-looking	Gallium arsenide infrared emitting diode (OP140) NPN silicon phototransistor (OP550)	0.50" (1.700 mm)
OPS692	Transistor	Lateral Side-looking	Gallium arsenide infrared emitting diode (OP140) NPN silicon phototransistor (OP550)	0.50" (1.700 mm)
OPS693	Transistor	Lateral Side-looking	Gallium arsenide infrared emitting diode (OP140) NPN silicon phototransistor (OP550)	0.50" (1.700 mm)
OPS698	Transistor	Lateral Side-looking	Gallium arsenide infrared emitting diode (OP145) NPN silicon phototransistor (OP555)	0.50" (1.700 mm)



## General Note

TT Electronics reserves the right to make changes in product specification without notice or liability. All information is subject to TT Electronics' own data and is considered accurate at time of going to print.

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## OPS665, OPS666, OPS667



DIMENSIONS ARE IN INCHES AND [MILLIMETERS].

Pin #	LED & Diode X=0.060" (1.5)	Transistor X=0" (0.0 mm)
1	Anode	Emitter
2	Cathode	Collector

## OPS691, OPS692, OPS693



DIMENSIONS ARE IN INCHES AND [MILLIMETERS].

Pin #	LED X=0.060" (1.5)	Sensor X=0" (0.0 mm)
1	Cathode	Emitter/Anode
2	Anode	Collector/Cathode

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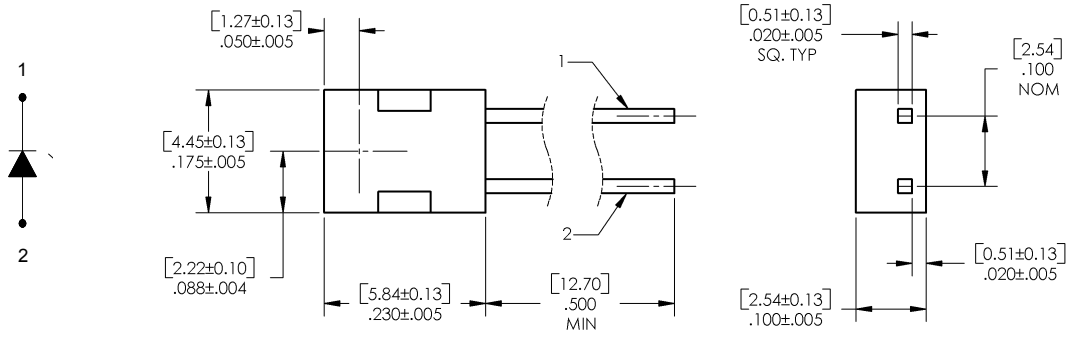
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## OPS698



DIMENSIONS ARE IN INCHES AND [MILLIMETERS].

Pin #	Diode
1	Cathode
2	Anode

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## Electrical Specifications

<b>Absolute Maximum Ratings</b> ( $T_A = 25^\circ\text{C}$ 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]	260°C <sup>(1)</sup>
<b>Input Diode</b>	
Forward DC Current	50 mA
Peak Forward Current (1 $\mu\text{s}$ pulse width, 300 pps)	3.0 A
Reverse DC Voltage	2.0 V
Power Dissipation	100 mW <sup>(2)</sup>
<b>Output Photosensor (OPS665/666/667) or Output Phototransistor (691/692/693/698)</b>	
Collector-Emitter Voltage	30 V
Emitter-Collector Voltage	5 V
Power Dissipation	100 mW <sup>(2)</sup>

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OPS693, OPS698



## Electrical Specifications

Electrical Characteristics (T <sub>A</sub> = 25° C unless otherwise noted)						
SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
<b>Input Diode</b>						
V <sub>F</sub>	Forward Voltage	-	-	1.6	V	I <sub>F</sub> = 20 mA
I <sub>R</sub>	Reverse Current	-	-	100	µA	V <sub>R</sub> = 2 V
<b>Output Phototransistor</b>						
V <sub>(BR)CEO</sub>	Collector-Emitter Breakdown Voltage	30	-	-	V	I <sub>C</sub> = 100 µA, E <sub>E</sub> = 0
V <sub>(BR)ECO</sub>	Emitter-Collector Breakdown Voltage	5.0	-	-	V	I <sub>E</sub> = 100 µA, E <sub>E</sub> = 0
I <sub>CEO</sub>	Collector-Emitter Dark Current	-	-	100	nA	V <sub>CE</sub> = 15 V, I <sub>F</sub> = 0, I <sub>E</sub> = 0
	OPS665/666/667	-	-	100	nA	V <sub>CE</sub> = 10 V, I <sub>F</sub> = 0, I <sub>E</sub> = 0
	OPS691/692/693 OPS698	-	-	100	nA	V <sub>CE</sub> = 10 V, I <sub>F</sub> = 0, I <sub>E</sub> = 0
<b>Combined</b>						
V <sub>CE(SAT)</sub>	Collector-Emitter Saturation Voltage	-	-	-	-	-
	OPS665/666/667	-	-	0.4	V	I <sub>F</sub> = 20 mA, I <sub>C</sub> = 50 µA <sup>(3)</sup>
	OPS691/692/693 OPB698	-	-	0.4	V	I <sub>F</sub> = 20 mA, I <sub>C</sub> = 50 µA <sup>(3)</sup>
I <sub>C(ON)</sub>	On-State Collector Current	-	-	-	-	-
	OPS665	0.5	-	-	mA	V <sub>CE</sub> = 5 V, I <sub>F</sub> = 20 mA <sup>(3)</sup>
	OPS666	1.0	-	-	mA	
	OPS667	5.0	-	-	mA	
	OPS691	500	-	-	µA	V <sub>CE</sub> = 10 V, I <sub>F</sub> = 20 mA <sup>(3)</sup>
	OPS692 OPS693, OPS698	1.0 2.0	- -	- -	mA mA	

**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) Distance from lens tip to lens tip is 0.250" (6.35 mm) - OPS665, OPS666, OPS667  
Distance from lens tip to lens tip is 0.125" (3.175 mm) - OPS691 thru OPS698

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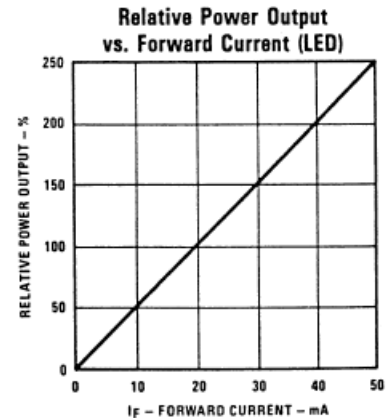
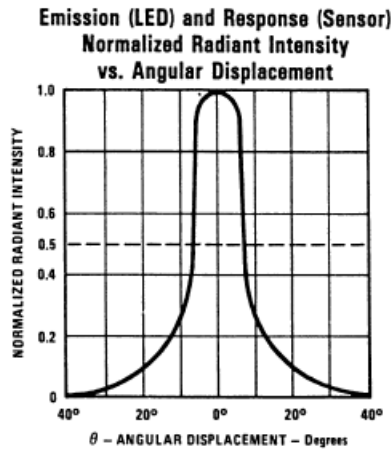
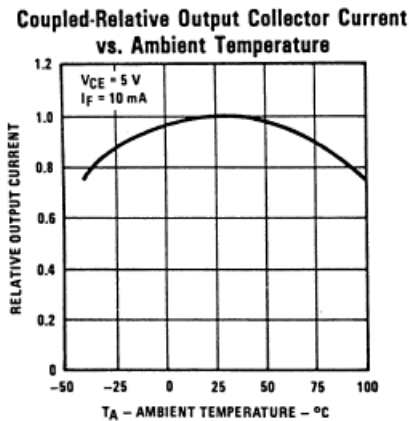
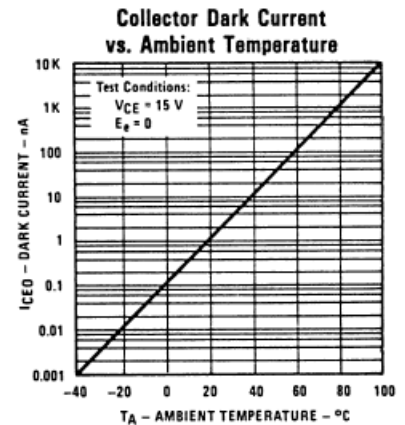
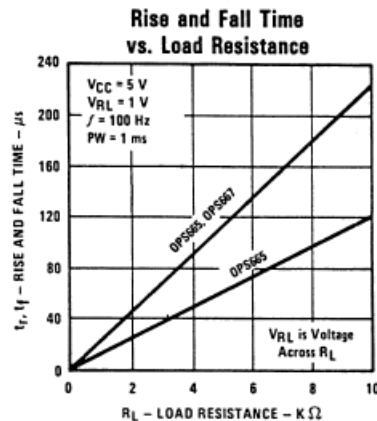
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## Performance

OPS665, OPS666, OPS667



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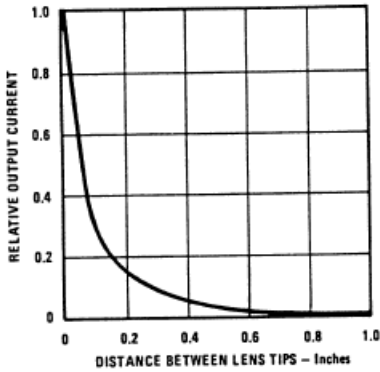
OPS665, OPS666, OPS667, OPS691, OPS692, OPS693, OPS698



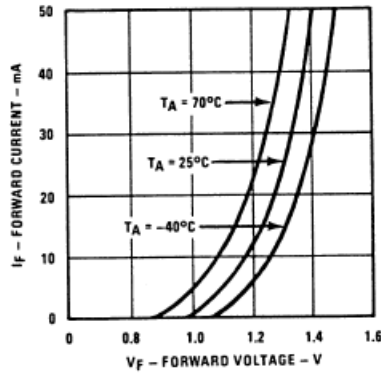
## Performance

OPS691, OPS692, OPS693

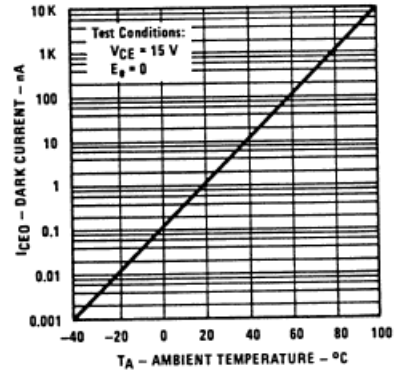
**Coupling Characteristics of OP140 and OP550**



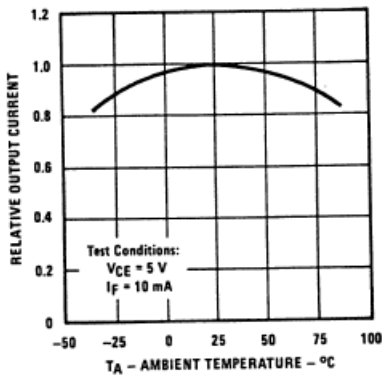
**Forward Current vs Forward Voltage**



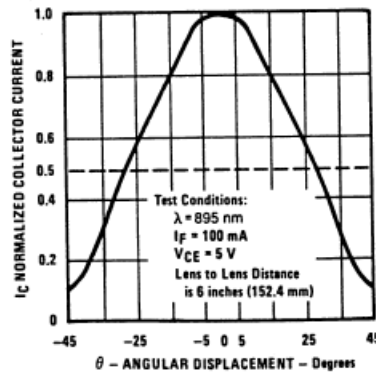
**Dark Current vs Free Air Temperature**



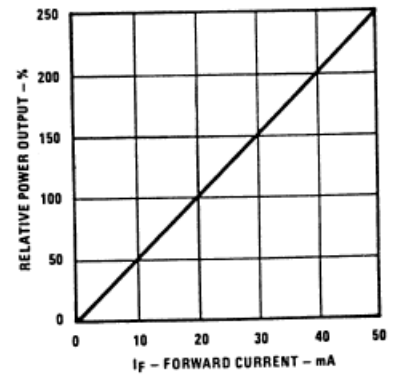
**Relative Output Current vs Free Air Temperature**



**Normalized Collector Current vs Angular Displacement**



**Relative Power Output vs Forward Current (LED)**



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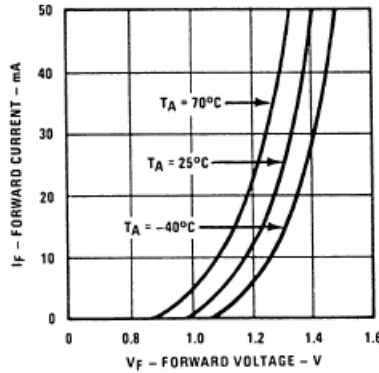
## Performance

### OPS698

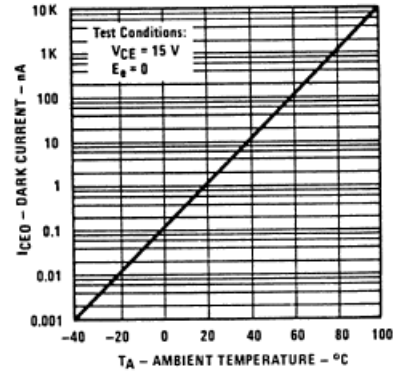
**Coupling Characteristics of OP145 and OP555**



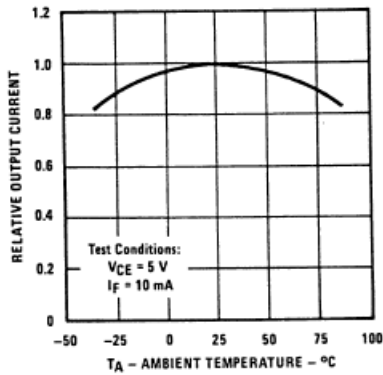
**Forward Current vs Forward Voltage**



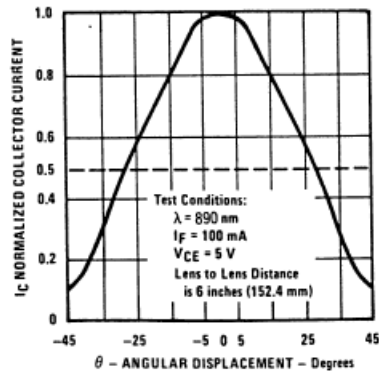
**Dark Current vs Free Air Temperature**



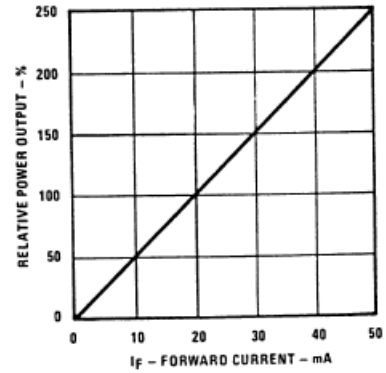
**Relative Output Current vs Free Air Temperature**



**Normalized Collector Current vs Angular Displacement**



**Relative Power Output vs Forward Current (LED)**



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