

# iC-VP

## PHOTO SWITCH



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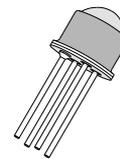
### FEATURES

- High spectral sensitivity
- Sensitive to visible light and near infrared
- Adjustable threshold
- Short switching time
- Supply voltage of 4.5 to 16 V
- CMOS-/LSTTL-compatible output
- Photo sensor size: 400  $\mu\text{m}$  x 400  $\mu\text{m}$
- Option: extended temperature range of -40 to 125  $^{\circ}\text{C}$

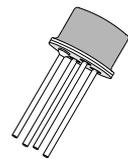
### APPLICATIONS

- Receiver for reflecting and non-reflecting light barriers
- Multi-chip modules for absolute encoders

### PACKAGES

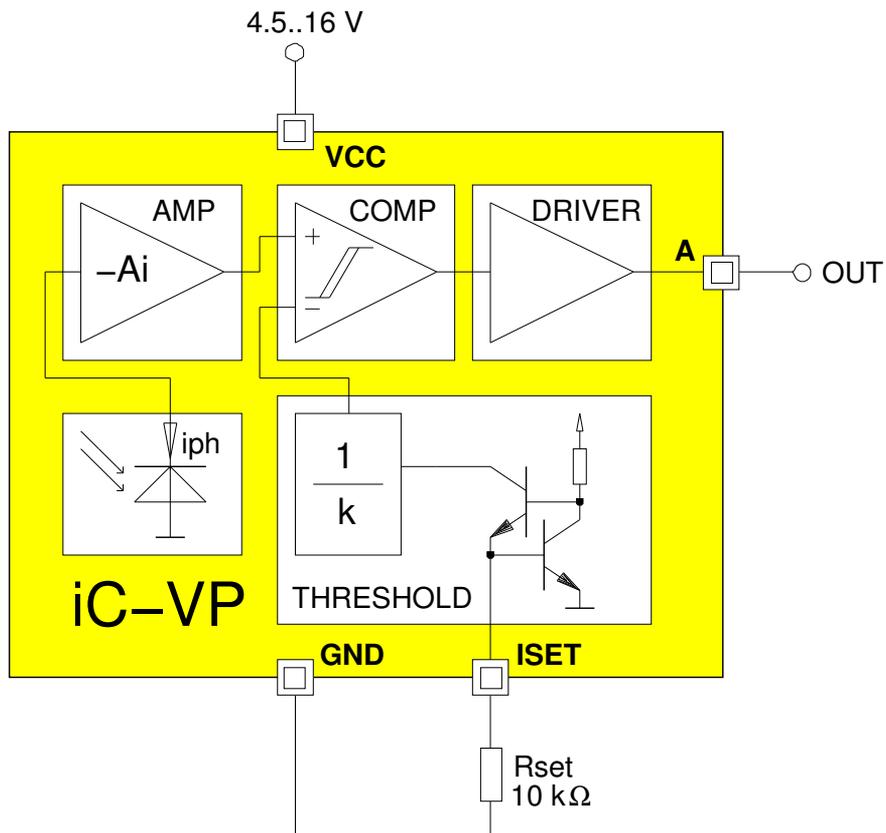


TO18-4L  
(lens)



TO18-4F  
(flat)

### BLOCK DIAGRAM



### DESCRIPTION

The iC-VP is a photocurrent amplifier with threshold switch and monolithic integrated sensor diode. The device is meant as a photoelectric detector, in light barriers for example.

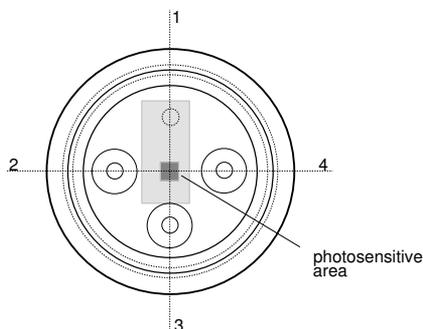
The threshold is adjusted with an external resistor. After approx. 1  $\mu$ s delay a photo current of sufficient magnitude creates a low signal which is compatible with CMOS and LSTTL levels at the output.

The iC-VP can be utilised in a customised COB package as a multi-chip module for multi-channel scanning absolute encoders.

TO18 metal can packages are available for single-channel light barrier applications.

### PACKAGES TO18-4L/F

#### PIN CONFIGURATION



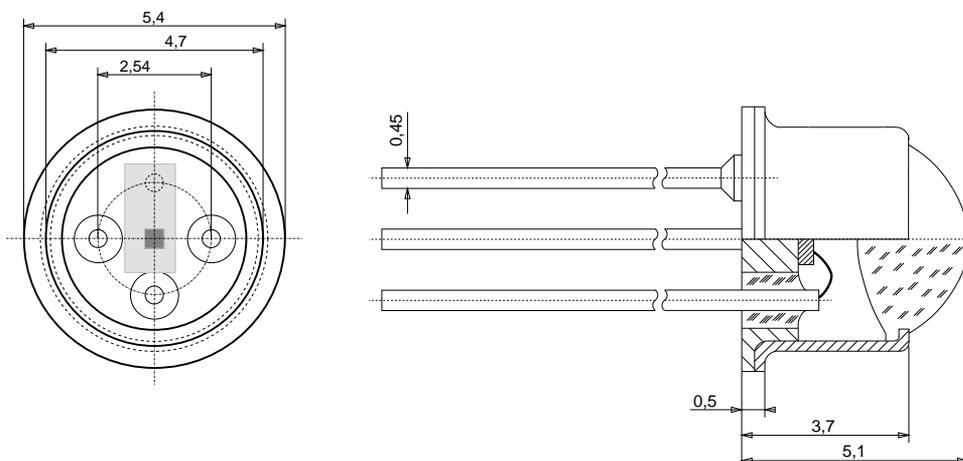
Optical input from top

#### PIN FUNCTIONS

##### No. Name Function

1	GND	Ground
2	A	Output
3	ISET	Threshold Adjustment
4	VCC	Supply Voltage 4.5...16 V

#### PHYSICAL DIMENSIONS (in mm)



#### PACKAGE LABEL

iC-VP Code  
yyww

### ABSOLUTE MAXIMUM RATINGS

Beyond these values damage may occur; device operation is not guaranteed.

Item No.	Symbol	Parameter	Conditions	Limits		Unit
				Min.	Max.	
G001	VCC	Supply Voltage		0	18	V
G002	V(A)	Voltage at Output A		0	VCC	V
G003	I(A)	Current in Output A		-5	8	mA
G004	Tj	Junction Temperature		-40	130	°C
G005	Ts	Storage Temperature		-40	130	°C

### THERMAL DATA

Operating Conditions: VCC = 4.5...16 V

Item No.	Symbol	Parameter	Conditions	Limits			Unit
				Min.	Typ.	Max.	
T01	Ta	Operating Ambient Temperature Range (extended temperature range on request)	TO18-4L/F package	-25		90	°C

All voltages are referenced to ground unless otherwise stated.

All currents flowing into the device pins are positive; all currents flowing out of the device pins are negative.

### ELECTRICAL CHARACTERISTICS

Operating Conditions: VCC = 4.5...16 V, Tj = -40...125 °C, unless otherwise stated

Item No.	Symbol	Parameter	Conditions				Unit
				Min.	Typ.	Max.	
<b>Total Device</b>							
001	VCC	Permissible Supply Voltage		4.5		16	V
002	I(VCC)	Supply Current in VCC, Output hi	I(A) = 0, iph = 0, A = hi; RSET = 1.4 kΩ RSET = 7 kΩ RSET = 70 kΩ			3.1 1.8 1.5	mA mA mA
003	I(VCC)	Supply Current in VCC, Output hi	I(A) = 0, iph = 0, A = hi, Tj = 27 °C; RSET = 1.4 kΩ RSET = 7 kΩ RSET = 70 kΩ		2.0 1.1 0.8		mA mA mA
004	I(VCC)	Supply Current in VCC, Output lo	I(A) = 0, A = lo; RSET = 1.4 kΩ, iph = 2 μA RSET = 7 kΩ, iph = 200 nA RSET = 70 kΩ, iph = 20 nA			8.1 5.5 5.0	mA mA mA
005	I(VCC)	Supply Current in VCC, Output lo	I(A) = 0, A = lo, Tj = 27 °C; RSET = 1.4 kΩ, iph = 2 μA RSET = 7 kΩ, iph = 200 nA RSET = 70 kΩ, iph = 20 nA		4.3 2.2 1.6		mA mA mA
<b>Photodiode</b>							
101	Aph	Radiant Sensitive Area		0.4 x 0.4			mm <sup>2</sup>
102	S(λ)max	Spectral Sensitivity	λ = 850 nm		0.5		A/W
103	Se(λ)	Range of Spectral Sensitivity	Se(λ) = 0.1 x S(λ)max	500		1050	nm
104	Ierr	Error Current at Photodiode	Tj = -40 °C Tj = 27 °C Tj = 70 °C Tj = 125 °C			5 5 8 25	nA nA nA nA
<b>Photocurrent Amplifier</b>							
201	fo	Upper Cutoff Frequency	Triangular waveform, iph = 0...(2 x Iphth); RSET = 1.4 kΩ RSET = 7 kΩ RSET = 70 kΩ	400 200 50			kHz kHz kHz
<b>Comparator</b>							
301	Hys	Hysteresis with reference to the Photocurrent Threshold Iphth		-30	-20	-15	%
<b>Threshold Adjustment ISET</b>							
401	V(ISET)	Voltage at ISET	RSET = 1.4...70 kΩ Tj = -40 °C Tj = 27 °C Tj = 70 °C Tj = 125 °C	420	780 660 580 480	830	mV mV mV mV
402	TC	Temperature Coefficient of V(ISET)	Tj = -40 °C Tj = 27 °C Tj = 70 °C Tj = 125 °C	-2.05	-1.83 -1.87 -1.90 -1.93	-1.7	mV/°C mV/°C mV/°C mV/°C
403	Iphth	Photocurrent Threshold for V(A) = lo	RSET = 1.4 kΩ, Tj = 27 °C  RSET = 7 kΩ  RSET = 70 kΩ		1/500 x ISET 1/880 x ISET 1/1000 x ISET		
404	Emax	Maximum Permissible Illuminance	higher than threshold Iphth, output A stays low; TO18-4L TO18-4F			5 50	klx klx

### ELECTRICAL CHARACTERISTICS

Operating Conditions:  $V_{CC} = 4.5...16\text{ V}$ ,  $T_j = -40...125\text{ °C}$ , unless otherwise stated

Item No.	Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
<b>Driver Output A</b>							
501	Vs(A)hi	Saturation Voltage hi	$V_{s(A)hi} = V_{CC} - V(A)$ ; $I(A) = -400\text{ }\mu\text{A}$ $T_j = 27\text{ °C}$		0.8	1.0	V
502	Vs(A)lo	Saturation Voltage lo	$I(A) = 5\text{ mA}$ $T_j = 27\text{ °C}$		0.22	0.4	V
503	Isc(A)hi	Short-Circuit Current hi	$V_{CC} = 16\text{ V}$ , $V(A) = 0$	-30	-15		mA
504	Isc(A)lo	Short-Circuit Current lo	$V(A) = V_{CC}$		38	50	mA

### OPTICAL CHARACTERISTICS

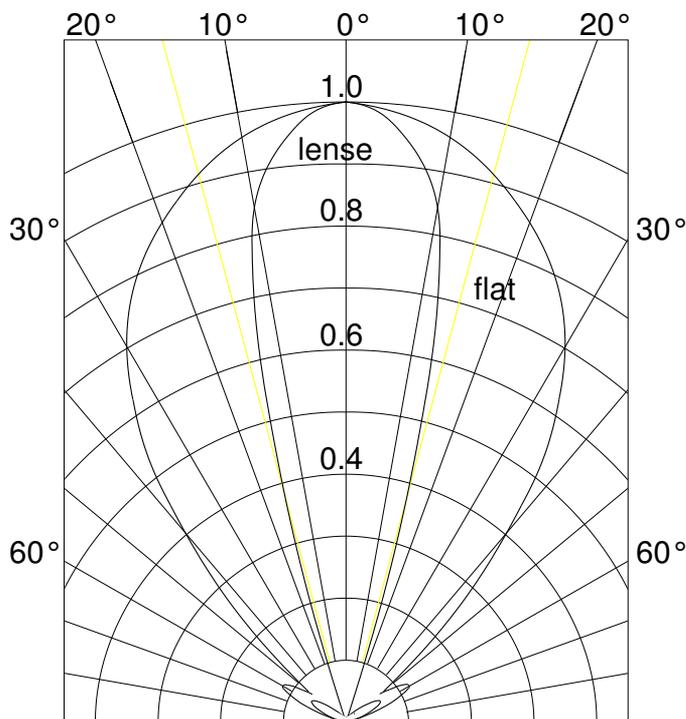


Figure 1: Directional characteristics  $S_{rel}(\phi)$

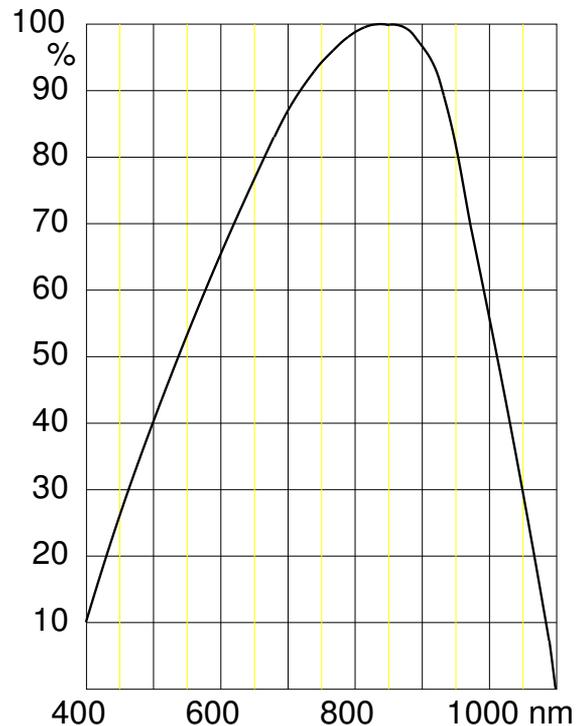


Figure 2: Relative spectral sensitivity  $S_{rel}(\lambda)$

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**ORDERING INFORMATION**

Type	Package	Order Designation
iC-VP	TO18-4L (lens) TO18-4F (flat)	iC-VP TO18-4L iC-VP TO18-4F

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