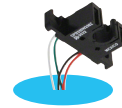
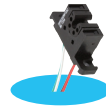
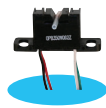
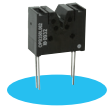
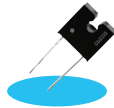


# Assemblies

TT Electronics' standard assemblies provide space saving solutions of up to 80%, as compared to discrete packaged parts. A full range of available products includes tube liquid sensors, optical slotted switches, reflective object sensors, optical emitters and sensor pairs, dual encoders, and long distance reflective and optical switches. TT Electronics can provide complete design and manufacturing services of all assemblies. This includes final assembly and 100% testing, as well as standard chip carrier and custom packaging options. Product ranges include an extensive range of unique shapes, mounting configurations and material combinations.

## Tube Liquid Sensor






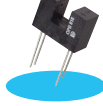

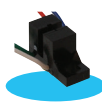

Model Number	OPB350	OPB350L062	OPB350W062Z	OPB350W125Z	OPB350W250Z
Package	Slotted N	Slotted N	Slotted T	Slotted T	Slotted T
LED Peak Wavelength (nm)	890	890	890	890	890
Tube Size	0.125"	0.062" [1.57 mm]	0.062" [1.57 mm]	0.125" [3.18 mm]	0.250"
I <sub>C(ON)</sub> Ratio Typ	01:03.0	01:03.0	01:03.0	2.5	01:02.3
I <sub>F</sub> (mA) Typ/Max	5/50	5/50	5/50	5/50	5/50
V <sub>CE</sub> (V) (Max)	30	30	30	24	30
Lead Length/Spacing	0.33"/0.32"	0.33"/0.32"	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire







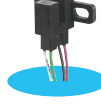
## Slotted Optical Switches







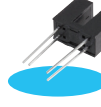


Model Number	OPB200	OPB365T55	OPB380P55Z	OPB380T51Z	OPB390L11Z	OPB390P11Z	OPB390T51Z
Package	Slotted L	Slotted T	Slotted P	Slotted T	Slotted L	Slotted P	Slotted T
Wavelength (nm) (Typ)	890	890	890	890	890	890	890
Slot Width/Depth	0.200"/0.320"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"
Aperture Emitter/Sensor	0.06"/0.06"	0.05"/0.05"	0.05"/0.05"	0.05"/0.01"	0.01"/0.01"	0.01"/0.01"	0.05"/0.01"
I <sub>F</sub> (mA) Typ/Max	20/50	20/50	20/50	20/50	20/50	20/50	20/50
Light Current I <sub>C(ON)</sub> (mA) Min/Max	1.0/6.0	3.5/14.0	1.0/5.0	2.5/10.0	1.0/5.0	1.0/5.0	2.5/10.0
V <sub>CE</sub> (V) (Max)	30	30	30	30	30	30	30
Lead Length/Spacing	0.425"/0.400"	0.425"/0.320"	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire

## Slotted Optical Switches (Continued)

							
Model Number	OPB390T55Z	OPB804	OPB816Z	OPB818	OPB820S10	OPB821S5Z	OPB825
Package	Slotted T	Slotted N	Slotted T	Slotted N	Slotted P	Slotted P	Slotted N
Wavelength (nm) (Typ)	890	935	890	890	890	890	890
Slot Width/Depth	0.125"/0.345"	0.150"/0.330"	0.200" / 0.635"	0.200"/0.250"	0.125"/0.345"	0.080"/0.255"	0.160"/0.285"
Aperture Emitter/Sensor	0.05"/0.05"	0.06"/0.06"	0.05"/0.01"	0.06"/0.06"	0.04"/0.01"	0.04"/0.005"	0.06"/0.06"
I <sub>F</sub> (mA) Typ/Max	20/50	20/30	20/50	20/30	20/50	20/50	20/30
Light Current I <sub>C(ON)</sub> (mA) Min/Max	3.5/14.0	0.5/N/A	N/A/30	0.1/N/A	0.50/N/A	0.30 /N/A	0.5/N/A
V <sub>CE</sub> (V) (Max)	30	30	30	30	30	30	30
Lead Length/Spacing	24"/26 AWG Wire	0.425"/0.300"	24"/26 AWG Wire	0.425"/0.400"	0.425"/0.275"	24"/26 AWG Wire	0.200"/0.300"

							
Model Number	OPB828D	OPB829CZ	OPB829DZ	OPB830W11Z	OPB830W55Z	OPB831W55Z	OPB832W55Z
Package	Slotted T	Slotted T	Slotted T	Slotted T	Slotted T	Slotted T	Slotted T
Wavelength (nm) (Typ)	890	890	890	880	880	890	880
Slot Width/Depth	0.120"/0.315"	0.125"/0.315"	0.125"/0.315"	0.125"/0.315"	0.125"/0.315"	0.125"/0.315"	0.125"/0.315"
Aperture Emitter/Sensor	0.06"/0.01"	0.06"/0.06"	0.06"/0.01"	0.01"/0.01"	0.05"/0.05"	0.05"/0.05"	0.05"/0.05"
I <sub>F</sub> (mA) Typ/Max	20/50	20/50	20/50	20/50	20/50	20/50	20/50
Light Current I <sub>C(ON)</sub> (mA) Min/Max	1.8/N/A	1.8/N/A	1.8/N/A	0.625/N/A	0.625/N/A	1.25/N/A	2.25/N/A
V <sub>CE</sub> (V) (Max)	30	30	30	30	30	30	30
Lead Length/Spacing	0.425"/0.220"	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire

							
Model Number	OPB840L11	OPB840W11Z	OPB840W51Z	OPB840W55Z	OPB842W51Z	OPB857Z	OPB870N11
Package	Slotted T	Slotted T	Slotted T	Slotted T	Slotted T	Slotted Channel	Slotted N
Wavelength (nm) (Typ)	890	880	880	880	880	890	890
Slot Width/Depth	0.125"/0.315"	0.125"/0.315"	0.125"/0.315"	0.125"/0.315"	0.125"/0.315"	0.150"/0.355"	0.125"/0.345"
Aperture Emitter/Sensor	0.05"/0.01"	0.01"/0.01"	0.05"/0.01"	0.05"/0.05"	0.05"/0.01"	0.06"/0.06"	0.01"/0.01"
I <sub>F</sub> (mA) Typ/Max	20/50	20/50	20/50	20/50	20/50	20/50	20/50
Light Current I <sub>C(ON)</sub> (mA) Min/Max	0.625/N/A	0.625/N/A	0.625/N/A	0.625/N/A	2.25/N/A	1.5/N/A	0.5/N/A
V <sub>CE</sub> (V) (Max)	30	30	30	30	30	30	30
Lead Length/Spacing	0.425"/0.320"	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	11.5"/26 AWG Wire	0.425"/0.320"

## Slotted Optical Switches (Continued)



Model Number	OPB871N51	OPB880P51Z	OPB880T51Z	OPB885Z	OPB890P51Z	OPB891T51Z
Package	Slotted N	Slotted P	Slotted T	Slotted P	Slotted P	Slotted T
Wavelength (nm) (Typ)	890	890	890	890	890	890
Slot Width/Depth	0.125"/0.345"	0.125"/0.345"	0.125"/0.315"	0.375"/0.595"	0.125"/0.345"	0.125"/0.315"
Aperture Emitter/Sensor	0.05"/0.01"	0.05"/0.01"	0.05"/0.01"	0.05"/0.05"	0.05"/0.01"	0.05"/0.01"
$I_f$ (mA) Typ/Max	20/50	20/50	20/50	20/50	20/50	20/50
Light Current $I_{C(ON)}$ (mA) Min/Max	1.0/N/A	0.5/N/A	0.5/N/A	1.3/8.0	0.5/N/A	1.0/N/A
$V_{CE}$ (V) (Max)	30	30	30	30	30	50
Lead Length/Spacing	0.425"/0.320"	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire

## Wide Gap Slotted Optical Switches



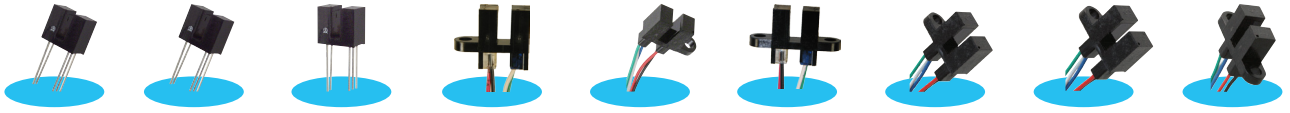
Model Number	OPB800L55	OPB800W51Z	OPB810L51	OPB810W51Z	OPB811L55	OPB811W55Z
Package	Slotted T	Slotted T	Slotted T	Slotted T	Slotted T	Slotted T
Wavelength (nm) (Typ)	890	890	890	890	890	890
Slot Width/Depth	0.375"/0.350"	0.375"/0.350"	0.375"/0.350"	0.375"/0.350"	0.375"/0.350"	0.375"/0.350"
Aperture Emitter/Sensor	0.05"/0.05"	0.05"/0.01"	0.05"/0.01"	0.05"/0.01"	0.05"/0.05"	0.05"/0.05"
$I_f$ (mA) Typ/Max	20/50	20/50	20/50	20/50	20/50	20/50
Light Current $I_{C(ON)}$ (mA) Min/Max	0.05/N/A	0.05/N/A	0.05/N/A	0.05/N/A	1.0/N/A	1.0/N/A
$V_{CE}$ (V) (Max)	30	30	30	30	30	30
Lead Length/Spacing	0.425"/0.570"	24"/26 AWG Wire	0.425"/0.570"	24"/26 AWG Wire	0.425"/0.570"	24"/26 AWG Wire

## Photologic® Slotted Optical Switches



Model Number	OPB930W51Z	OPB930W55Z	OPB933W51Z	OPB940W51Z	OPB941W51Z	OPB943W51Z	OPB961N51	OPB961T51	OPB970N11
Package	Slotted T	Slotted T	Slotted T	Slotted T	Slotted T	Slotted T	Slotted N	Slotted T	Slotted N
Sensor Type	Totem-Pole	Totem-Pole	Inv-Open-Collector	Totem-Pole	Open-Collector	Inv-Open-Collector	Open-Collector	Open-Collector	Totem-Pole
Wavelength (nm) (Typ)	0.125"/0.315"	0.125"/0.315"	0.125"/0.315"	0.125"/0.315"	0.125"/0.315"	0.125"/0.315"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"
Slot Width/Depth	0.05"/0.01"	0.05"/0.05"	0.05"/0.01"	0.05"/0.01"	0.05"/0.01"	0.05"/0.01"	0.05"/0.01"	0.05"/0.01"	0.01"/0.01"
Aperture Emitter/Sensor	880	880	880	880	880	880	890	890	890
$I_f$ (mA) Typ/Max	20/50	20/50	20/50	20/50	20/50	20/50	20/50	20/50	20/50
$I_{CC}/I_{CCH}$ (mA) Max	15/15	15/15	15/15	15/15	15/15	15/15	15/15	15/15	15/15
$V_{CC}$ (V) Min/Max	4.75/5.25	4.75/5.25	4.75/5.25	4.75/5.25	4.75/5.25	4.75/5.25	4.5/16.0	4.5/16.0	4.5/16.0
Lead Length/Spacing	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	0.425"/0.320"	0.425"/0.320"	0.425"/0.320"

## Photologic® Slotted Optical Switches

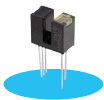


Model Number	OPB970N51	OPB971N51	OPB973N51	OPB980L51Z	OPB980L55Z	OPB980T55Z	OPB982P51Z	OPB983P51Z	OPB983T51Z
Package	Slotted N	Slotted N	Slotted N	Slotted L	Slotted L	Slotted T	Slotted P	Slotted P	Slotted T
Sensor Type	Totem-Pole	Open-Collector	Inv-Open-Collector	Totem-Pole	Totem-Pole	Totem-Pole	Inv-Totem-Pole	Inv-Open-Collector	Inv-Open-Collector
Wavelength (nm) (Typ)	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"
Slot Width/Depth	0.05"/0.01"	0.05"/0.01"	0.05"/0.01"	0.05"/0.01"	0.05"/0.05"	0.05"/0.05"	0.05"/0.01"	0.05"/0.01"	0.05"/0.01"
Aperture Emitter/Sensor	890	890	890	890	890	890	890	890	890
I <sub>F</sub> (mA) Typ/Max	20/50	20/50	20/50	20/50	20/50	20/50	20/50	20/50	20/50
I <sub>CC1</sub> /I <sub>CC2</sub> (mA) Max	15/15	15/15	15/15	15/15	15/15	15/15	15/15	15/15	15/15
V <sub>CC</sub> (V) Min/Max	4.5/16.0	4.5/16.0	4.5/16.0	4.5/16.0	4.5/16.0	4.5/16.0	4.5/16.0	4.5/16.0	4.5/16.0
Lead Length/Spacing	0.425"/0.320"	0.425"/0.320"	0.425"/0.320"	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire



Model Number	OPB990L51Z	OPB990P51Z	OPB990T51Z	OPB990T55Z	OPB991L51Z	OPB992T51Z	OPB993L11Z
Package	Slotted L	Slotted P	Slotted T	Slotted T	Slotted L	Slotted T	Slotted L
Sensor Type	Totem-Pole	Totem-Pole	Totem-Pole	Totem-Pole	Open-Collector	Inv-Totem-Pole	Inv-Open-Collector
Wavelength (nm) (Typ)	0.125"/0.345"	0.125"/0.315"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"	0.125"/0.345"
Slot Width/Depth	0.05"/0.01"	0.05"/0.01"	0.05"/0.01"	0.05"/0.05"	0.05"/0.01"	0.05"/0.01"	0.01"/0.01"
Aperture Emitter/Sensor	890	890	890	890	890	890	890
I <sub>F</sub> (mA) Typ/Max	20/50	20/50	20/50	20/50	20/50	20/50	20/50
I <sub>CC1</sub> /I <sub>CC2</sub> (mA) Max	15/15	15/15	15/15	15/15	15/15	15/15	15/15
V <sub>CC</sub> (V) Min/Max	4.5/16.0	4.5/16.0	4.5/16.0	4.5/16.0	4.5/16.0	4.5/16.0	4.5/16.0
Lead Length/Spacing	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire

## Photologic® Slotted Optical Switches



Model Number	OPB460N11
Package	Slotted N
Sensor Type	10K Pull-up
Gap Width/Depth	0.125"/0.345"
Aperture Emitter/Sensor	0.01"/0.01"
Wavelength (nm) (Typ)	890
I <sub>F</sub> (mA) Typ/Max	20/50
I <sub>CC1</sub> /I <sub>CC2</sub> (mA) Max	7.5/7.5
V <sub>CC</sub> (Volts) Min/Max	4.5/16.0
Lead Length/ Spacing	0.425"/0.320"

## Deep Gap Slotted Switch Wire and Connector Options



Model Number	OPB815L	OPB815WZ
Package	Slotted T	Slotted T
Wavelength (nm) (Typ)	890	890
Slot Width/Depth	0.375"/0.350"	0.375"/0.430"
Aperture Emitter/Sensor	0.06"/0.06"	0.06"/0.06"
I <sub>F</sub> (mA) Typ/Max	20/50	20/50
Light Current I <sub>C(ON)</sub> (mA) Min/Max	0.05/N/A	1.0/N/A
V <sub>CE</sub> (V) (Max)	30	30
Lead Length/Spacing	0.100"/0.530"	24"/26 AWG Wire

## Optical Emitter and Sensor Pair



Model Number	OPB100Z	OPB100-EZ	OPB100-SZ
Package	Module Pair	1/2 Module Pair	1/2 Module Pair
LED Wavelength (nm)	880	880	-
Sensor Type	Phototransistor	-	Phototransistor
$I_{C(ON)}$ (mA) Min/Max	5.0	N/A	N/A
$I_F$ (mA) Typ/Max	20/100	20/100	N/A
$V_{CE}$ (V) (Max)	30	N/A	30
Lead Length/Spacing	24"/26 AWG Wire	-	24"/26 AWG Wire

## Slotted Optical Flag Switch



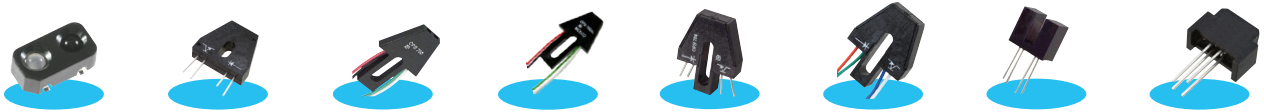
Model Number	OPB680-20
Package	Flag Switch
Wavelength (nm) (Typ)	890
Sensor Type	Rbe Transistor
Flag Travel Degrees Max	51°
$I_{C(ON)}$ (mA) Min/Max	0.6
$I_F$ (mA) Typ/Max	10/50
$V_{CE}$ (V) (Max)	30
Lead Length/Spacing	0.100"/0.275"

## Photologic® Slotted Optical Switch "Wide Gap" Series



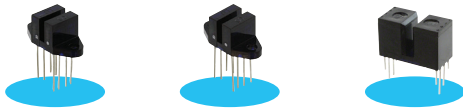
Model Number	OPB900W55Z	OPB901W55Z	OPB903W55Z	OPB910W55Z	OPB911W55Z	OPB912W55Z	OPB913W55Z
Package	Slotted T	Slotted T	Slotted T	Slotted T	Slotted T	Slotted T	Slotted T
Sensor Type	Totem-Pole	Open-Collector	Inv-Open-Collector	Totem-Pole	Open-Collector	Inv-Totem-Pole	Inv-Open-Collector
Gap Width/Depth	0.375"/0.350"	0.375"/0.350"	0.375"/0.350"	0.375"/0.350"	0.375"/0.350"	0.375"/0.350"	0.375"/0.350"
Aperture Emitter/Sensor	0.05"/0.05"	0.05"/0.05"	0.05"/0.05"	0.05"/0.05"	0.05"/0.05"	0.05"/0.05"	0.05"/0.05"
Wavelength (nm) (Typ)	890	890	890	890	890	890	890
$I_F$ (mA) Typ/Max	20/50	20/50	20/50	20/50	20/50	20/50	20/50
$I_{CC}/I_{CCH}$ (mA) Max	15/15	15/15	15/15	15/15	15/15	15/15	15/15
$V_{CC}$ (Volts) Min/Max	4.75/5.25	4.75/5.25	4.75/ 5.25	4.75/ 5.25	4.75/5.25	4.75/ 5.25	4.75/ 5.25
Lead Length/Spacing	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire	24"/26 AWG Wire

## Reflective Object Sensors



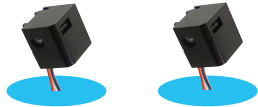
Model Number	OPB733TR	OPB745	OPB700ALZ	OPB701ALZ	OPB704	OPB704WZ	OPB706A	OPB711
Package	SMD Reflective Object	Reflective Switch	Reflective Switch	Reflective Switch	Reflective Switch	Reflective Switch	Cube Reflective	Flat Reflective
Sensor Type	Transistor	Darlington	Transistor	Darlington	Transistor	Transistor	Transistor	Transistor
Wavelength (nm) (Typ)	890	890	890	890	890	890	935	890
Reflection Distance Inch (mm)	0.4 (10.16 mm) to 1 (25.4 mm)	0.150" (3.81 mm)	0.200" (5.08 mm)	0.200" (5.08 mm)	0.150" (3.81 mm)	0.150" (3.81 mm)	0.050" (1.27 mm)	0.080" (2.03 mm)"
$I_{C(ON)}$ (mA) Min	0.1	0.1	0.1	2.5	0.2	0.2	0.5	0.35
$I_F$ (mA) Typ/Max	20/50	40/40	40/100	40/50	40/40	40/40	20/50	20/50
$V_{CE}$ (V) (Max)	30	15	24	15	30	30	24	24
Lead Length/Spacing	-	0.150"/N/A	18"/26 AWG Wire	18"/26 AWG Wire	0.160"/N/A	24"/26 AWG Wire	0.45"/0.087", 0.100"	0.30"/0.095", 0.100"

## Dual Channel Encoder



Model Number	OPB822S	OPB822SD	OPB826SD
Package	Dual Slotted	Dual Slotted	Dual Slotted
Wavelength (nm) (Typ)	935	935	890
Gap Width/Depth	0.090"/0.300"	0.090"/0.300"	0.100"/0.420"
$I_{C(ON)}$ (mA) Min	0.25	0.1	0.1
$I_f$ (mA) Typ/Max	20/50	20/50	20/50
$V_{CE}$ (V) Typ/Max	30	30	30
Aperture Emitter/Sensor	N/A/0.01"	0.01"/0.01"	0.04"/0.04"
Lead Length/Spacing	0.425"/0.300"	0.425"/0.300"	0.200"/0.740"

## Photologic® Reflective Object Sensors



Model Number	OPB716Z	OPB718Z
Package	Object Reflective	Object Reflective
Sensor Type	Open-Collector	Inv-Open-Collector
Wavelength (nm) (Typ)	890	890
Reflection Distance Inch (mm)	0.50"	0.50"
$I_{CC}/I_{CCH}$ (mA) Max	0.1/0.01	0.1/0.01
$I_f$ (mA) Typ/Max	30/30	30/30
$V_{CC}$ (V) (Min/Max)	4.75/5.25	4.75/5.25
Lead Length/Spacing	18"/26 AWG Wire	18"/26 AWG Wire

## Long Distance Optical Switch



Model Number	OPB732WZ
Package	Object Reflective
Sensor Type	Transistor
Wavelength (nm) (Typ)	850
Reflection Distance Inch (mm)	3.0" (76.2 mm)
$I_{C(ON)}$ (mA) Min	0.25
$V_{CE}$ (V) (Max)	30
Lead Length/Spacing	24"/26 AWG Wire

## Long Distance Reflective Switch



Model Number	OPB720B-12Z	OPB720B-30VZ	OPB755TZ
Package	Objective Reflective	Objective Reflective	Reflective Switch
Sensor Type	Open-Collector	Open-Collector	Transistor & Rbe
Wavelength (nm) (Typ)	890	890	890
Reflection Distance Inch (mm)	12" [30.5 cm]	30" [76.2 cm]	0.08"/0.15"/0.22"
$I_f$ (mA) Typ/Max	N/A	N/A	30/50
$V_{CC}$ (V) or $V_{CE}$ (V) (Min/Max)	4/7 $V_{CC}$	4/7 $V_{CC}$	N/A/24 $V_{CE}$
$I_{C(ON)}$ (mA) Min	N/A	N/A	0.500/0.375/0.250
$V_{CE}$ (V) (Max)	30	30	30
Lead Length/Spacing	39" [99 cm]	39" [99 cm]	12"/26 AWG Wire