

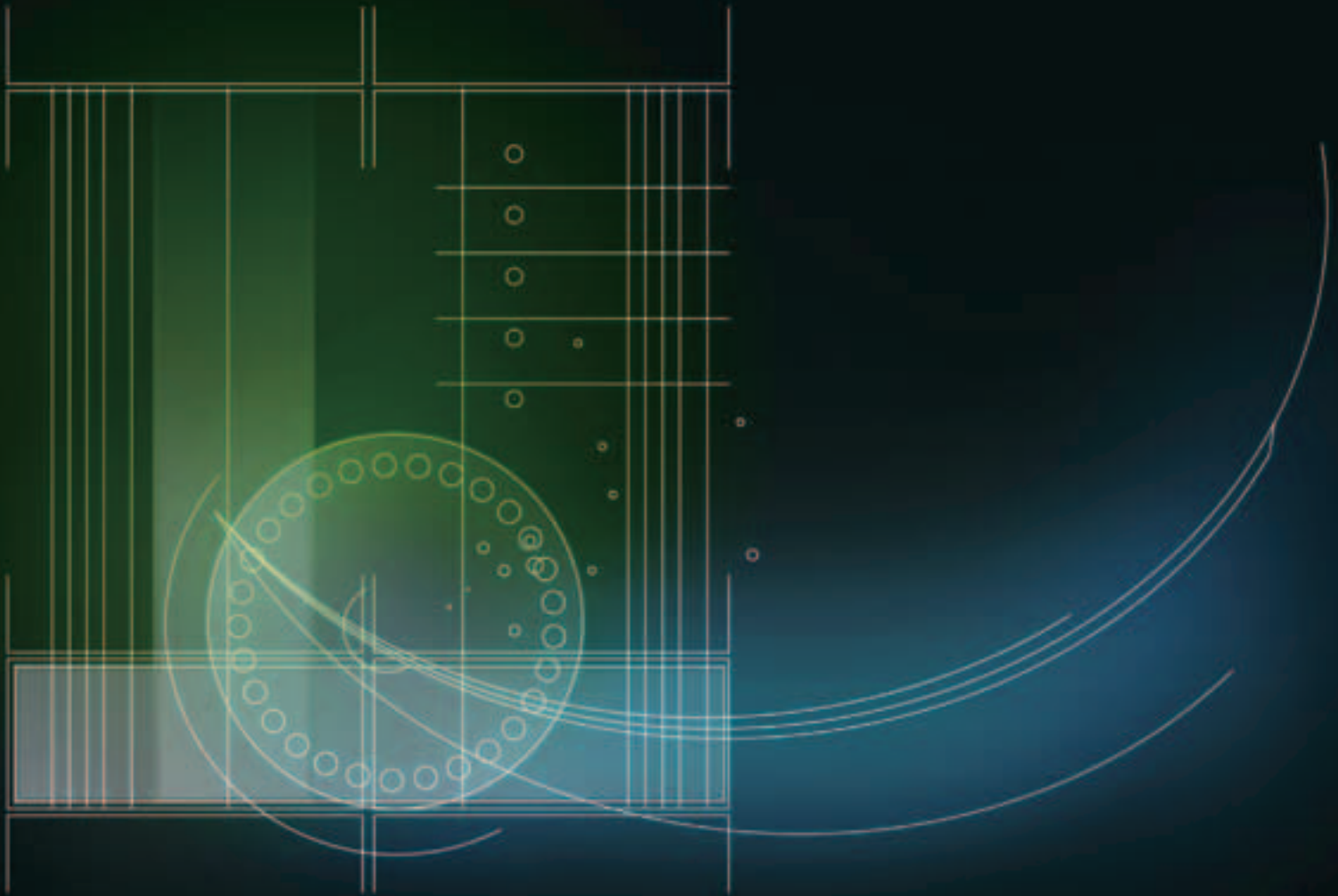
# TOSHIBA

2007-2

Leading Innovation >>>

PRODUCT GUIDE

# Photosensors



# PHOTOSENSOR

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TPS611(F)	9	TPS853	11		

# PRODUCT GUIDE

## 2 New Product Digest

### Surface-Mount Photo-IC for Ambient Light Sensors

TPS856

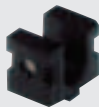


The TPS856 is a photo-IC that incorporates a photodiode, a current amplifier and a luminous-efficiency correction function in a single chip. Employing a new filter technology, luminous-efficiency function has been improved and achieved an excellent responsivity that is close to the response of human eyes. In addition, the TPS856 can be operated at lower voltage than the previous series. The power dissipation of this photo-IC is also reduced by using a standby pin. Further enhanced features of the TLP856 as a power saving device contributes to power saving in various display and automated devices.

- Compact slim surface-mount package: 1.6 mm x 1.6 mm x 0.55 mm (typ.)
- Low supply voltage:  $V_{cc} = 1.8$  to 5.5 V
- High sensitivity: light current ( $I_L$ ) = 40 to 80  $\mu$ A at  $E_v = 100$  lx using a fluorescent light
- Standby function

### Ultra-Compact and High-Efficiency Surface-Mount Photointerrupter

TLP848



The TLP848 is an ultra-compact surface-mount photointerrupter offers the industry's smallest form factor\* and highest current transfer ratio\*. The TLP848 is ideal products for electronic portable devices such as camera phones and digital cameras that require space-critical, mechanical and electrical designs.

\*: Compared with competitors' sales brochures in April 2006.

- Package: 2.8 mm x 1.9 mm x 2.5 mm (typ.)
- Gap width: 1.2 mm (typ.)
- Slit width: 0.3 mm (typ.)
- High current transfer ratio:  $I_c/I_F = 3$  to 24%

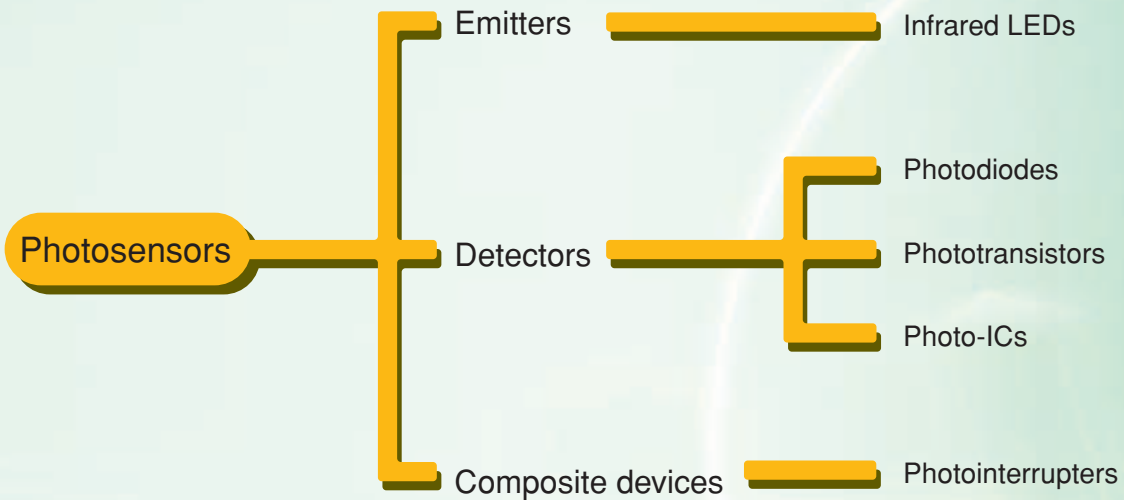
As of February 2007

■ Documents related to the products in this catalog are also available on the following website:

<http://www.semicon.toshiba.co.jp/eng/product/opto/index.html>

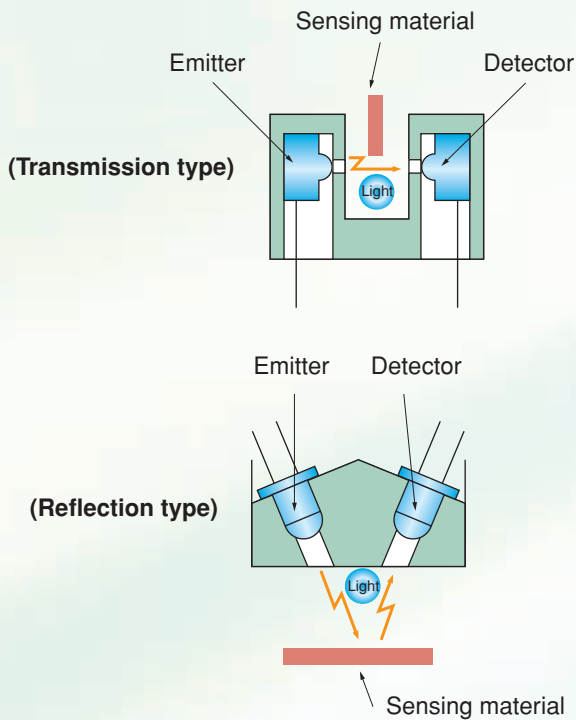
## 3 Classification of Photosensors

Photosensors are classified as follows:

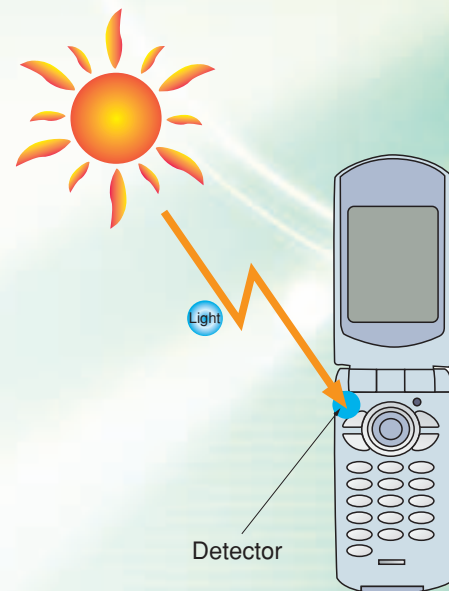


## 4 Services Provided by Photosensors

### Position detection



### Ambient light sensors





## 5 Features of Photosensors

### Infrared LEDs

- TLN100 Series ..... Infrared LEDs of  $\lambda_p$  (peak-emission wavelength) = 940 nm to 950 nm  
The light output is greater than that of visible LEDs and is most suitable for light sources for optoelectronic switches.
- TLN200 Series ..... Infrared LEDs of  $\lambda_p$  = 870 nm to 880 nm. The radiant power is greater than that of the TLN100 Series.

### Photodiodes

- TPS700 Series ..... High-speed response detectors best suited for optical remote controls and various analog detection

### Phototransistors

- TPS600 Series ..... Highly sensitive detectors suitable for optoelectronic switches

### Photo-ICs







- TPS800 series ..... Detectors incorporate a photodiode and various circuits in a single chip.  
Digital output type: high-speed response and suitable for optoelectronic switches  
Linear output type: suitable for ambient light sensors, optoelectronic switches

### Photointerrupters

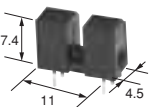
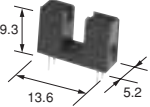
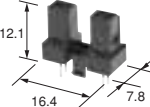
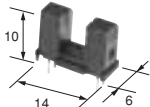
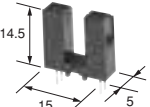
- TLP800 Series ..... Phototransistor output
- TLP1000 Series ..... Photo-IC output, which can be directly connected to a logic IC.
- TLP1200 Series ..... Photointerrupters with connectors  
Two output types are available: Phototransistor output and Photo-IC output.

## 6 Selection Guide by Package








### ■ Emitters and Detectors

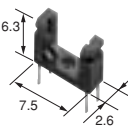

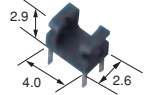
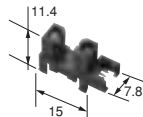
Package		TO-18CAN with Lens	φ3 Resin	φ5 Resin			
External Appearance							
Emitter	Infrared LED	TLN108(F) TLN201(F)	TLN119(F) TLN238(F)	TLN105B(F) TLN110(F) TLN115A(F) TLN231(F) TLN233(F)	TLN225(F) TLN226(F)	TLN227(F)	TLN117(F)
Detector	Photo-transistor	TPS601A(F)	TPS615(F) TPS616(F)	TPS610(F) TPS611(F)			TPS622(F)
	Photodiode						
	Photo-IC						

### ■ Photointerrupters

Package		PWB Direct Mounting				
External Appearance (mm)						
Gap (mm)		2	4.2	5	5	5
Slit Width (mm)		0.15	0.5*	—	0.5	0.5
Output Type	Photo-transistor	TLP830(F)	TLP831(F)	TLP828(F)	TLP832(F)	TLP833(F)
	Photo-IC				TLP1032(F) TLP1033A(F)	

\*: Horizontal slit

Side-View Package					Surface-Mount Package	
						
	TPS703(F) TPS704(F)	TPS830(F) TPS831(F)	TPS816(F)	TPS855(F)	TPS851 TPS853	TPS852 <b>NEW</b> TPS856
TPS820(F) TPS841(F) TPS842A(F) TPS843(F) TPS844(F)						

	Surface-Mount Package	PWB Direct Mounting	Snap-In Mounting
			
5 0.5	1.2 0.3	2 0.3	5 0.7
TLP841	<b>NEW</b> TLP848	TLP844	TLP1243(C8)
			TLP1255(C8, Q)

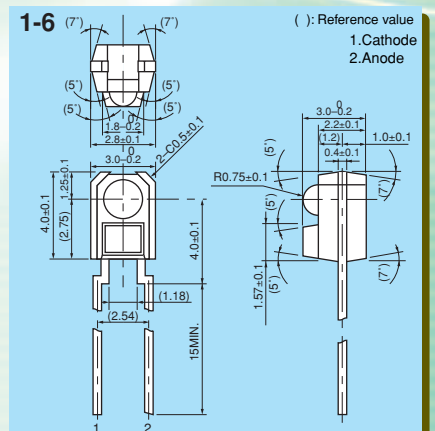
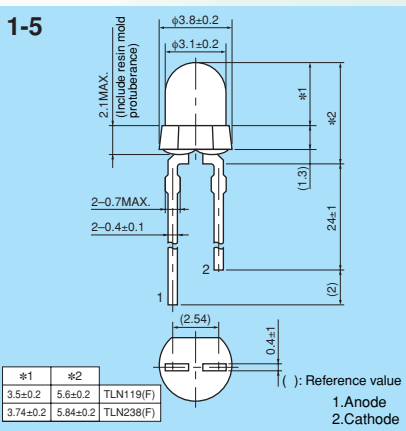
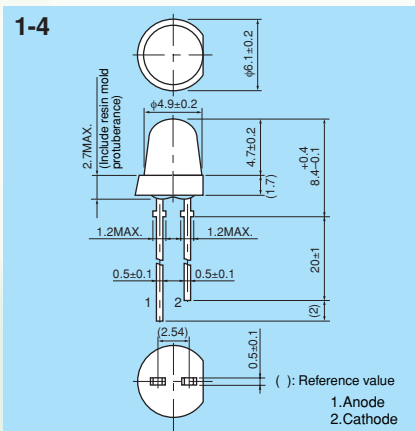
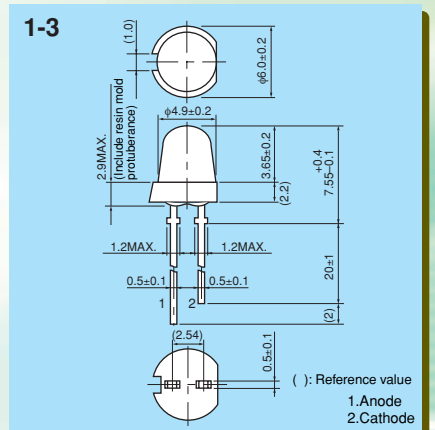
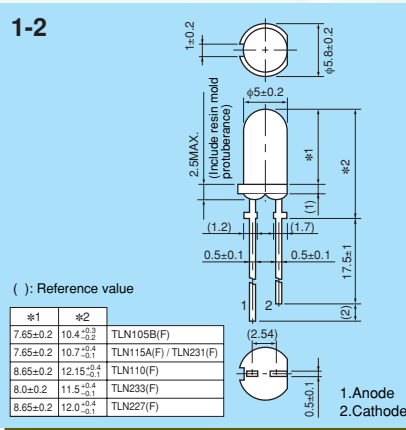
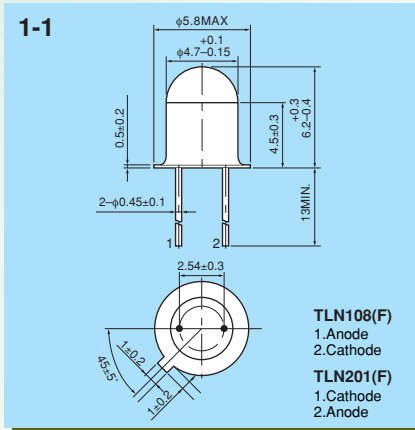
## 7 Product List

### 7.1 Infrared LEDs

Part No.	Package	Electrical and Optical Characteristics (Ta = 25 °C)									Package No.	Applications
		Radiant intensity (mW/sr)			Radiant power (mW)			Peak-emission wavelength (nm)	Half-angle value (°)			
		Part number with rank	Min	Max	If (mA)	Min	Max			If (mA)		
TLN108(F)	TO-18CAN with lens	-	10	-	50	-	-	-	940	±8	1-1	Optoelectronic switches
TLN201(F)		-	20	-	50	-	-	-	880	±7		
TLN105B(F)	φ 5	-	12	-	50	-	-	-	950	±23.5	1-2	Remote controls
TLN110(F)	φ 5	-	15	-	50	-	-	-	940	±8		Optoelectronic switches
TLN115A(F)	φ 5	-	15	-	50	-	-	-	950	±21	1-2	Remote controls
TLN115A(B, F)		19	-	-	-	-	-	-	-	-		Fiberless optical transmissions
TLN227(F)	φ 5	-	-	-	-	14	-	50	870	±5	1-3	Fiberless optical transmissions
TLN231(F)	φ 5	-	35	-	50	-	-	-	870	±16		Fiberless optical transmissions
TLN233(F)	φ 5	-	46	-	50	-	-	-	870	±13	1-4	Optoelectronic switches
TLN225(F)	φ 4.9	-	-	-	-	14	-	50	870	±21		Fiberless optical transmissions
TLN226(F)	φ 4.9	-	-	-	-	14	-	50	870	±13	1-5	Optoelectronic switches
TLN238(F)	φ 3	-	40	-	50	-	-	-	870	±18		
TLN119(F)	φ 3	-	2.5	10	20	-	-	-	945	±30	1-5	Optoelectronic switches
TLN119(B, F)		4.2	10	-	-	-	-	-	-	-		
TLN117(F)	Small side-view package	-	2	-	20	-	-	-	940	±15	1-6	Optoelectronic switches
TLN117(B, F)		2	7.5	-	-	-	-	-	-	-		
TLN117(C, F)		5	18.7	-	-	-	-	-	-	-		

Note: If = forward current

Unit: mm











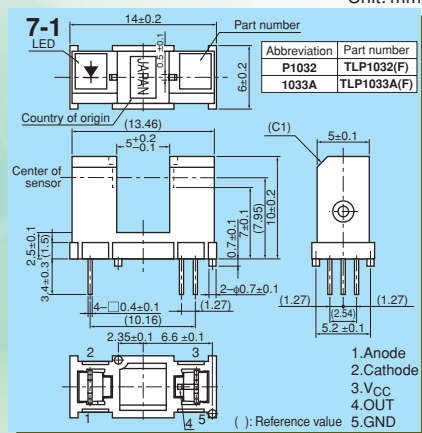


## 7.7 Photointerrupters (Photo-IC Output)

Part No.	Package	Gap (mm)	Slit Width (mm)	Electrical Characteristics (Ta = 25 °C)					Package No.	Applications
				output type		Threshold input current (mA)				
				w/resistor	open-collector	L→H max	H→L max	V <sub>CC</sub> (V)		
TLP1032(F)	PWB direct mounting	5	0.5		Y	3	–	2.7 to 15	7-1	Printers, Fax machines Copiers, Image scanners VCRs, Vending machines Tape readers Amusement equipment
TLP1033A(F)				Y	–	3	2.7 to 15			

Note: V<sub>CC</sub>: Supply voltage, PWB: Printed wired board

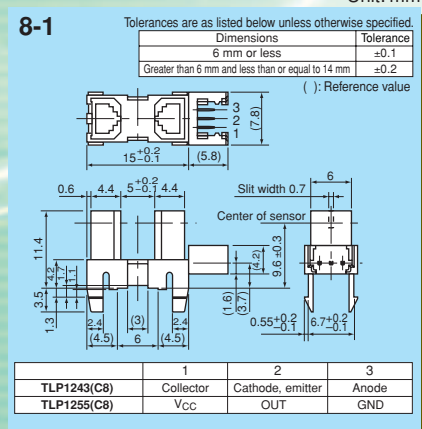
Unit: mm



## 7.8 Photointerrupters (with connectors)

Part No.	Package	Gap (mm)	Slit Width (mm)	Electrical Characteristics (Ta = 25 °C)			Package No.	Applications	
				Operating power supply voltage (V)	Output type				Connector manufacturer
					With resistor	Open-collector			
TLP1243(C8)	Snap-in mounting	5	0.7	V <sub>CE</sub> ≤ 35 V		Tyco Electronics AMP K.K.	8-1	Printers, Copiers, Fax machines Vending machines, FA equipment Amusement equipment	
TLP1255(C8, Q)		5	0.7	2.97 to 5.5	Y	Tyco Electronics AMP K.K.	8-1		

Unit: mm



## Connectors

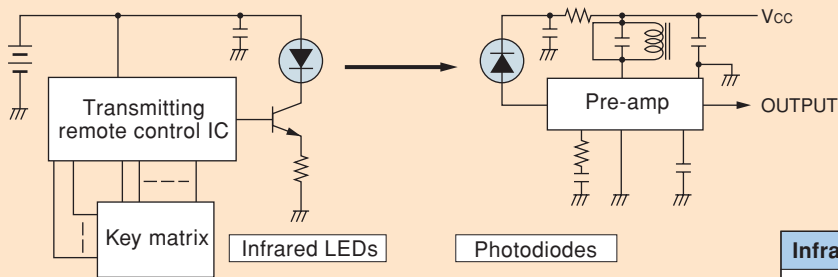
Mini CT Connectors (Receptacle assembly / housing crimp) Manufactured by Tyco Electronics AMP K.K.

Connector with Housing Terminal	Model No.	Connector Type	Terminal Material	AWG Size	External Diameter of Insulation Coating	Toshiba Part No.
	353293-3	Receptacle assembly	Phosphor bronze	AWG26~28	0.85 to 0.95 mm	TLP1243(C8)
	353908-3	Housing crimp				TLP1255(C8, Q)



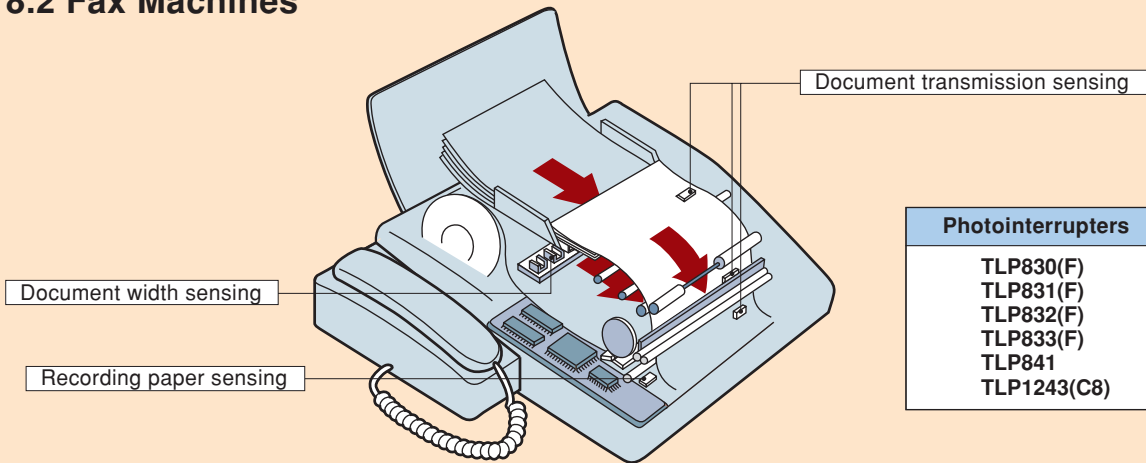
## 8 Application Examples

### 8.1 Optical Remote Controls



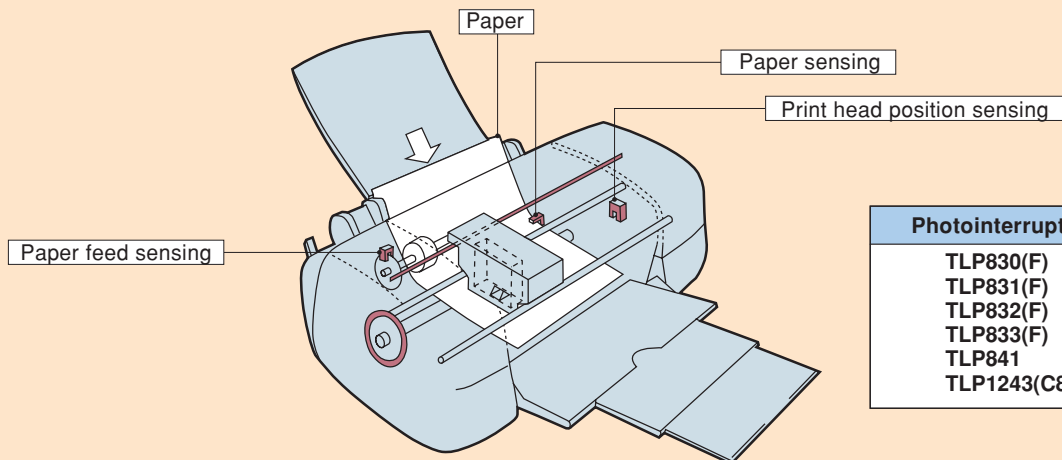
Infrared LED	Photodiodes
TLN105B(F) TLN115A(F)	TPS703(F) TPS704(F)

### 8.2 Fax Machines



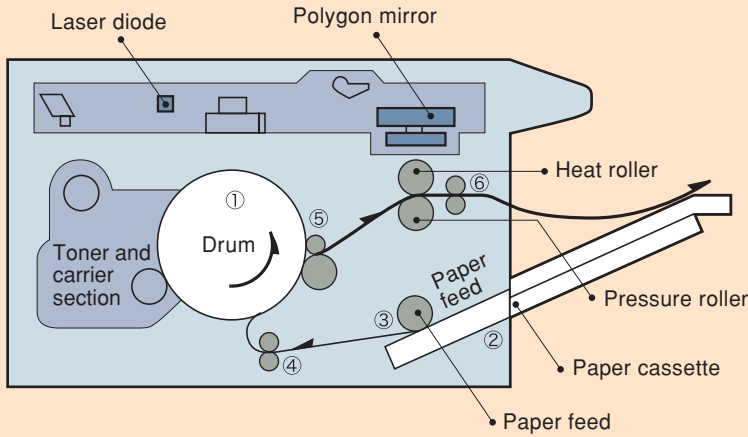
Photointerrupters
TLP830(F) TLP831(F) TLP832(F) TLP833(F) TLP841 TLP1243(C8)

### 8.3 Inkjet Printers



Photointerrupters
TLP830(F) TLP831(F) TLP832(F) TLP833(F) TLP841 TLP1243(C8)

## 8.4 Page Printers



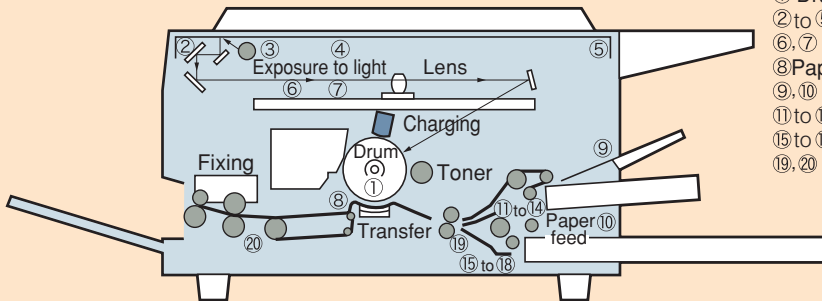
[Application examples]

- ① Drum revolution sensing
- ② Paper presence sensing
- ③, ④ Paper transport sensing
- ⑤ Paper separation sensing
- ⑥ Paper ejection sensing

### Photointerrupters

TLP832(F)  
 TLP833(F)  
 TLP841(F)  
 TLP1032(F)  
 TLP1033A(F)  
 TLP1243(C8)

## 8.5 Copiers



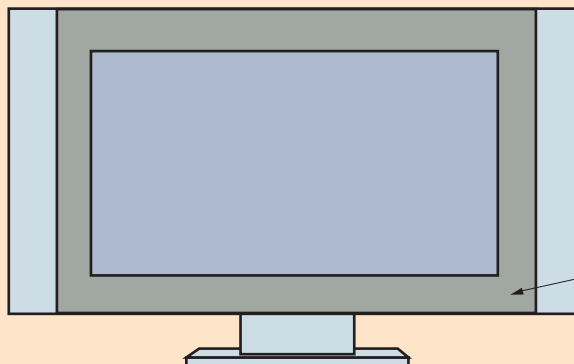
[Application examples]

- ① Drum position sensing
- ② to ⑤ Optics block position sensing
- ⑥, ⑦ Lens position sensing
- ⑧ Paper separation sensing
- ⑨, ⑩ Paper presence sensing
- ⑪ to ⑭ Upper cassette paper transport sensing
- ⑮ to ⑰ Lower cassette paper transport sensing
- ⑱, ⑳ Paper ejection and transport sensing

### Photointerrupters

TLP1000 Series  
 TLP1200 Series

## 8.6 TV Monitors

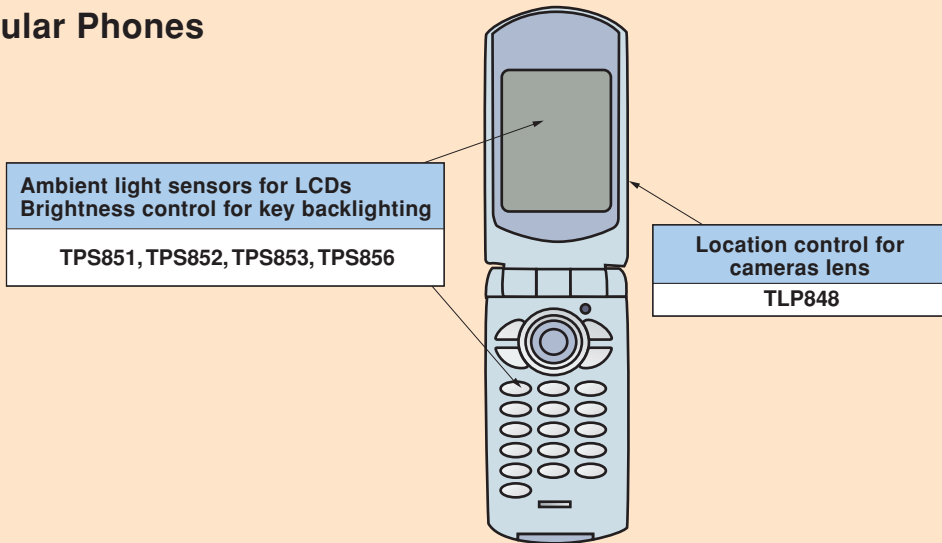


### Luminous adjustment for screens

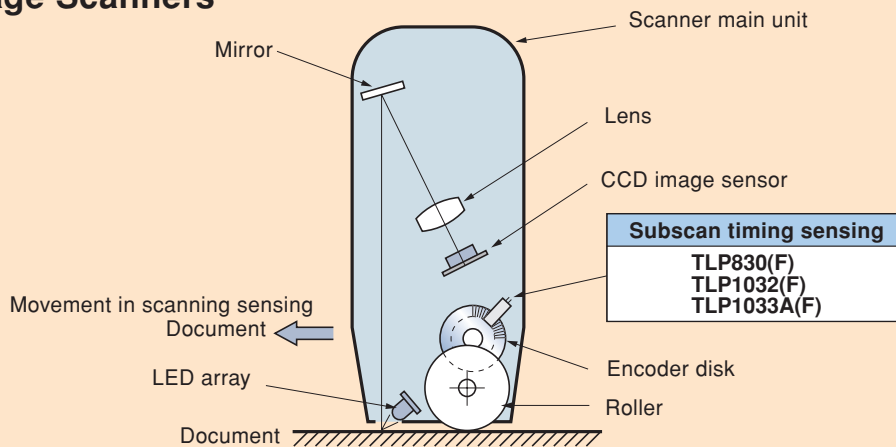
TPS851, TPS853  
 TPS855(F)

## 8 Application Examples

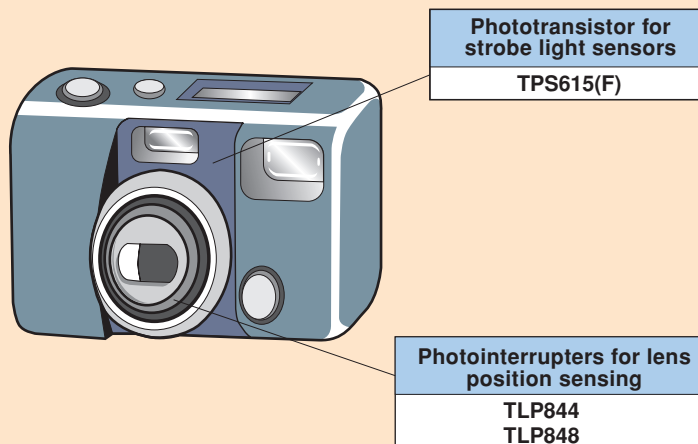
### 8.7 Cellular Phones



### 8.8 Image Scanners

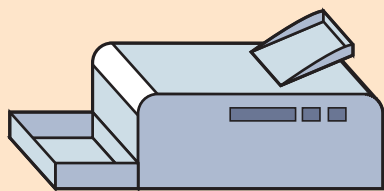


### 8.9 Digital Cameras

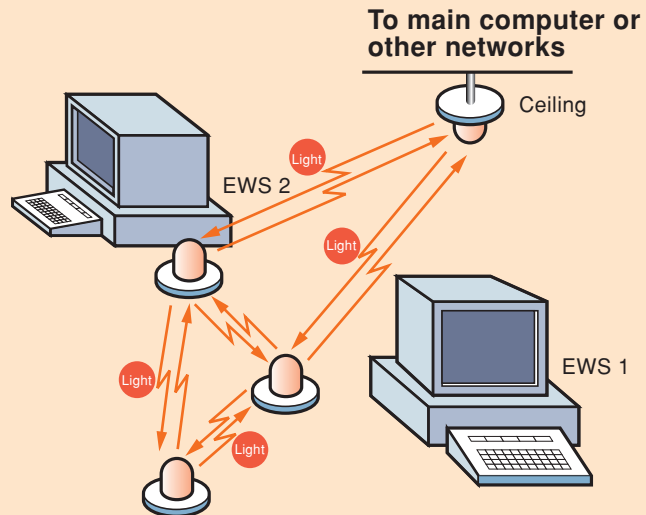


## 8.10 Office Networks

Infrared LEDs
TLN225(F)
TLN226(F)
TLN227(F)
TLN231(F)
TLN233(F)

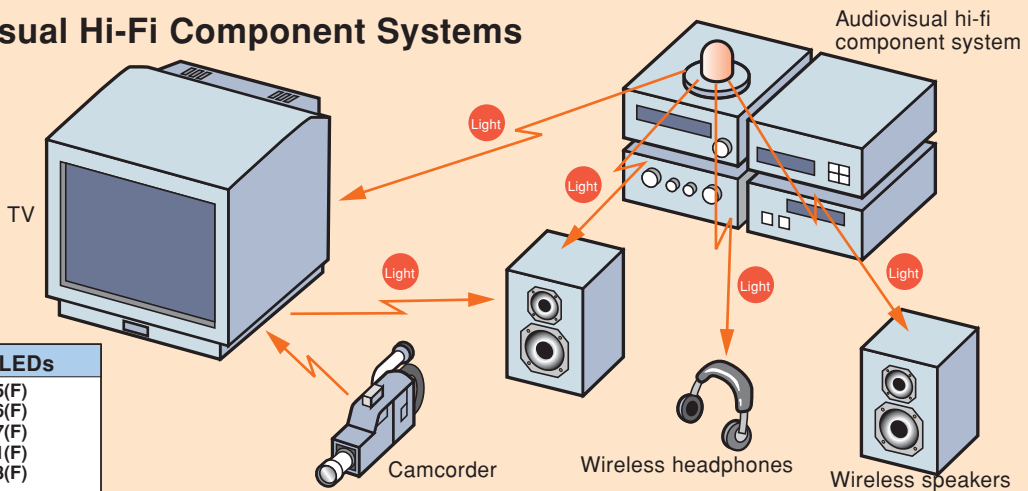


Printer

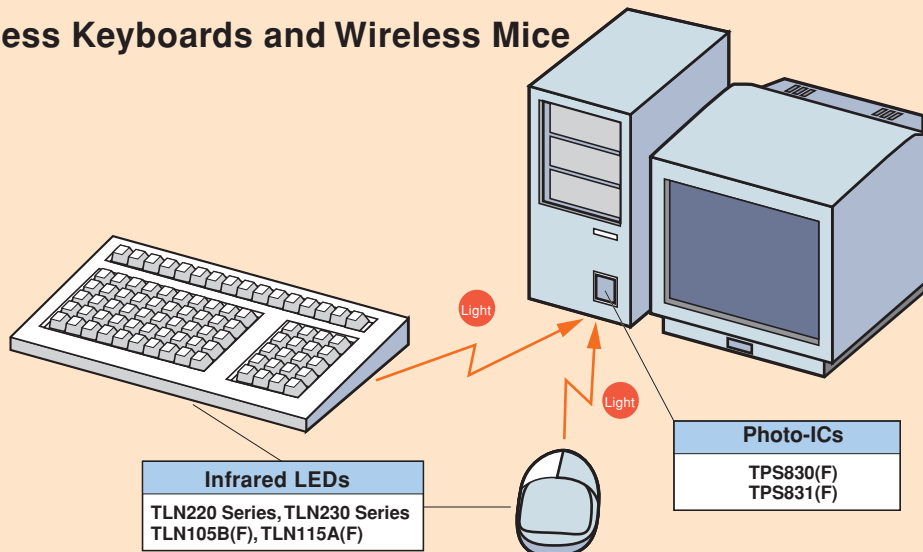


## 8.11 Audiovisual Hi-Fi Component Systems

Infrared LEDs
TLN225(F)
TLN226(F)
TLN227(F)
TLN231(F)
TLN233(F)



## 8.12 Wireless Keyboards and Wireless Mice



Infrared LEDs
TLN220 Series, TLN230 Series
TLN105B(F), TLN115A(F)

Photo-ICs
TPS830(F)
TPS831(F)

## 8 Application Examples

### 8.13 Others

Category	Appliances	Applications	Recommended Devices	
AV equipment	Camcorders	Ambient light sensors for monitor screens	TPS851, TPS852, TPS853	
	Digital still cameras			
	DVD players	Home position sensing for pick-up heads	TLP844	
Household appliances	Refrigerators	Icemaker internal position sensing	TLP800 Series	
		Ambient light sensors	TPS851, TPS853, TPS855(F)	
	Microwave ovens	Sensing of height and number of cooked objects	TLN108(F) → TPS601A(F)	
	Electric pots	Ambient light sensors	TPS851, TPS853, TPS855(F)	
	Air conditioners	Remote controls	TLN105B(F) TLN115A(F)	→ TPS703(F)
		Ambient light sensors	TPS851, TPS853, TPS855(F)	
		Louver direction sensing	TLP1000 Series	
	Automatic blinkers	Ambient light sensors	TPS851, TPS853, TPS855(F)	
	Washing machines	Sensing of degree of rinsing	TLN115A(F) → TPS611(F)	
Health equipment	Internal mechanism position sensing	Any photointerrupters		
Sewing machines	Needle up/down and cloth-feed sensing	Any photointerrupters		
Control and Measurement	Optoelectronic switches	Emitters and detectors	TLN108 } → TPS601A TLN201 } TLN117(F) → TPS816(F)	
			Automatic production machines	Internal mechanism position sensing
	Industrial robots	Object sensing	TLN108 → TPS601A	
Information devices, Automatic vending machines and Office equipment	Copiers	Paper size sensing, toner quantity sensing and toner density sensing	TLN117(F) → TPS820(F)	
	Printers	Paper size sensing, toner quantity sensing and toner density sensing	TLN117(F) → TPS820(F)	
	Automatic vending machines	Coin sensing and product feed sensing	TLN108 → TPS601A	
		Ambient light sensors	TPS851, TPS853, TPS855(F)	
	PDA's	Ambient light sensors for monitor screens	TPS851, TPS853, TPS852	
	Notebook PCs	Ambient light sensors for screens	TPS851, TPS853, TPS852	
PC monitors	Ambient light sensors for screens	TPS851, TPS853, TPS855(F)		
Communications Devices	Telephones	Hook sensors	TLP831(F)	
	Optical telephones	Information transmission	TLN115A(F) → { TPS704(F) TPS830(F) TPS831(F)	
	Optical communications	Space transmission	TLN115A(F) → TPS830(F), TPS831(F) TLN225(F) } TLN226(F) } TLN227(F) } TLN231(F) } TLN233(F)	
Others	Gaming equipment (pachinko, computer games, etc.)	Coin sensing and sensing of position of internal mechanism	TLN108 → TPS601A TLP1200 Series	
	Toys (rifle games, remote controls, robots and game controls)	Remote controls	TLN115A(F) → { TPS704(F) TPS830(F) TPS831(F) TLN231(F) TLN233(F)	



## 9

## End-of-Life Products

Note that the following products are end-of-life products and are not recommended for new designs. (As of Oct. 2006)

## Infrared LEDs

Part No.	Recommended Alternative Products	Compatibility
TLN101A	TLN108(F)	II
TLN102	-	-
TLN103A	TLN119(F)	III
TLN104	-	-
TLN104(LB)	-	-
TLN107A	TLN117(F)	III
TLN113	TLN119(F)	III
TLN203	TLN238(F)	III
TLN208	-	-
TLN210	-	-
TLN212	-	-
TLN217	-	-
TLN235	TLN238(F)	III
TLN236	TLN238(F)	III
TLN237	TLN233(F)	III

## Phototransistors

Part No.	Recommended Alternative Products	Compatibility
TPS603A	TPS615(F)	III
TPS604	-	-
TPS607A	-	-
TPS608A	-	-
TPS613	TPS615(F)	III
TPS614	-	-
TPS618	TPS622(F)	III

## Photodiodes

Part No.	Recommended Alternative Products	Compatibility
TPS705	TPS703(F)	III
TPS706	TPS703(F)	III
TPS720	-	-
TPS721A	-	-
TPS723A	-	-

## Photo-ICs

Part No.	Recommended Alternative Products	Compatibility
TPS805	TPS841(F)	III
TPS806	TPS842A(F)	III
TPS807	TPS843(F)	III
TPS808	TPS844(F)	III
TPS811	TPS841(F)	II
TPS812	TPS842A(F)	II
TPS813	TPS843(F)	II
TPS814	TPS844(F)	II
TPS818	TPS855(F)	III
TPS819	-	-
TPS850	-	-

## Reflective Photosensors

Part No.	Recommended Alternative Products	Compatibility
TLP907	-	-
TLP907(LB)	-	-
TLP908	-	-
TLP908(LB)	-	-
TLP909	-	-
TLP910	-	-
TLP921	-	-

## ■ Description of the compatibility

I : Electrically equivalent or enhanced. The products do not require any changes to the peripheral circuits.

II : Electrically equivalent or enhanced. Part of the peripheral circuits should be modified.

III : Electrically equivalent or enhanced. Peripheral circuits should be modified since the pin configuration and package are different from those of the previous products.

## Photointerrupters (case-type, ultra-compact package)

Part No.	Recommended Alternative Products	Compatibility
TLP507A	-	-
TLP810	-	-
TLP812	-	-
TLP814	TLP844	III
TLP818	-	-
TLP822	TLP832(F)	III
TLP824	TLP832(F)	III
TLP842	-	-
TLP853	-	-
TLP862	-	-
TLP1002A	TLP1032(F)	III
TLP1004A	TLP1032(F)	III
TLP1005A	TLP1033A(F)	III
TLP1025	-	-
TLP1031A	TLP1033A(F)	III
TLP1037A	TLP1033A(F)	III

## Photointerrupters with Connectors

Part No.	Recommended Alternative Products	Compatibility
TLP1214A	-	-
TLP1214A(C2)	-	-
TLP1217(C2)	-	-
TLP1230(C4)	TLP1243(C8)	III
TLP1231(C5)	TLP1243(C8)	III
TLP1241(C5)	TLP1243(C8)	III
TLP1242(C6)	TLP1243(C8)	III
TLP1251(C5, Q)	TLP1255(C8, Q)	III
TLP1252(C6, Q)	TLP1255(C8, Q)	III
TLP1253(C6, Q)	TLP1255(C8, Q)	III

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