

# TSL260R, TSL261R, TSL262R INFRARED LIGHT-TO-VOLTAGE OPTICAL SENSORS

TAOS049E – SEPTEMBER 2007

## Terminal Functions

TERMINAL NAME NO.	DESCRIPTION
GND 1	Ground (substrate). All voltages are referenced to GND.
OUT 3	Output voltage
V <sub>DD</sub> 2	Supply voltage

## Absolute Maximum Ratings over operating free-air temperature range (unless otherwise noted)<sup>†</sup>

Supply voltage, V <sub>DD</sub> (see Note 1)	6 V
Output current, I <sub>O</sub>	±10 mA
Duration of short-circuit current at (or below) 25°C (see Note 2)	5 s
Operating free-air temperature range, T <sub>A</sub>	–25°C to 85°C
Storage temperature range, T <sub>stg</sub>	–25°C to 85°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds (S Package)	260°C
Reflow solder, in accordance with J-STD-020C or J-STD-020D (SM Package)	260°C

<sup>†</sup> Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

- NOTES: 1. All voltages are with respect to GND.  
2. Output may be shorted to supply.

## Recommended Operating Conditions

	MIN	NOM	MAX	UNIT
Supply voltage, V <sub>DD</sub>	2.7		5.5	V
Operating free-air temperature, T <sub>A</sub>	0		70	°C

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**Electrical Characteristics at  $V_{DD} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$ ,  $\lambda_p = 940\text{ nm}$ ,  $R_L = 10\text{ k}\Omega$  (unless otherwise noted) (see Notes 3, 4, and 5)**

PARAMETER	TEST CONDITIONS	TSL260R			TSL261R			TSL262R			UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
$V_D$ Dark voltage	$E_e = 0$	0	4	10	0	4	10	0	4	10	mV
$V_{OM}$ Maximum output voltage	$V_{DD} = 4.5\text{ V}$	3	3.3		3	3.3		3	3.3		V
$V_O$ Output voltage	$E_e = 18\ \mu\text{W}/\text{cm}^2$	1	2	3							V
	$E_e = 46\ \mu\text{W}/\text{cm}^2$				1	2	3				
	$E_e = 220\ \mu\text{W}/\text{cm}^2$							1	2	3	
$\alpha_{vo}$ Temperature coefficient of output voltage ( $V_O$ )	$E_e = 18\ \mu\text{W}/\text{cm}^2$ , $T_A = 0^\circ\text{C}$ to $70^\circ\text{C}$	8									mV/ $^\circ\text{C}$
		0.4									%/ $^\circ\text{C}$
	$E_e = 46\ \mu\text{W}/\text{cm}^2$ , $T_A = 0^\circ\text{C}$ to $70^\circ\text{C}$				8						mV/ $^\circ\text{C}$
					0.4						%/ $^\circ\text{C}$
$E_e = 220\ \mu\text{W}/\text{cm}^2$ , $T_A = 0^\circ\text{C}$ to $70^\circ\text{C}$							8			mV/ $^\circ\text{C}$	
							0.4			%/ $^\circ\text{C}$	
$N_e$ Irradiance responsivity	See Note 6	111			43.5			9.1			mV/ $(\mu\text{W}/\text{cm}^2)$
$I_{DD}$ Supply current	$E_e = 18\ \mu\text{W}/\text{cm}^2$	1.1			1.7						mA
	$E_e = 46\ \mu\text{W}/\text{cm}^2$				1.1			1.7			
	$E_e = 220\ \mu\text{W}/\text{cm}^2$							1.1			

- NOTES: 3. Measurements are made with  $R_L = 10\text{ k}\Omega$  between output and ground.  
 4. Optical measurements are made using small-angle incident radiation from an LED optical source.  
 5. The input irradiance  $E_e$  is supplied by a GaAs LED with peak wavelength  $\lambda_p = 940\text{ nm}$   
 6. Irradiance responsivity is characterized over the range  $V_O = 0.05$  to  $2.9\text{ V}$ . The best-fit straight line of Output Voltage  $V_O$  versus irradiance  $E_e$  over this range will typically have a positive extrapolated  $V_O$  value for  $E_e = 0$ .

## Dynamic Characteristics at $T_A = 25^\circ\text{C}$ (see Figure 1)

PARAMETER	TEST CONDITIONS	TSL260R			TSL261R			TSL262R			UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
$t_r$ Output pulse rise time	$V_{DD} = 5\text{ V}$ , $\lambda_p = 940\text{ nm}$	260			70			7			$\mu\text{s}$
$t_f$ Output pulse fall time	$V_{DD} = 5\text{ V}$ , $\lambda_p = 940\text{ nm}$	260			70			7			$\mu\text{s}$
$V_n$ Output noise voltage	$V_{DD} = 5\text{ V}$ , $E_e = 0$ , $f = 1000\text{ Hz}$	0.8			0.7			0.6			$\mu\text{V}/\sqrt{\text{Hz}}$