

Electrical Characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
V _{OL}	SMBus output low voltage	I _O = 50 μA		0.01		V
		I _O = 4 mA			0.4	
I _{DD}	Supply current	Active, VSMBCLK and VSMDATA = V _{DD} , V _{DD} = 3.3 V ± 5%		0.35	0.6	mA
		Power down, VSMBCLK and VSMDATA = V _{DD} , V _{DD} = 3.3 V ± 5%			10	μA
I _{IH}	High level input current	V _I = V _{DD}			5	μA
I _{IL}	Low level input current	V _I = 0			-5	μA

Operating Characteristics, V_{DD} = 3.3 V, T_A = 25°C (unless otherwise noted) (see Notes 2, 3, 4)

PARAMETER		TEST CONDITIONS	CHANNEL	MIN	TYP	MAX	UNIT
ADC count value, standard mode		E _e = 0	Ch0			1	counts
			Ch1			1	
		λ _p = 640 nm E _e = 72 μW/cm ²	Ch0	639	799	959	
			Ch1		85		
		λ _p = 940 nm E _e = 140 μW/cm ²	Ch0	511	799	1039	
			Ch1		703		
ADC count value, extended mode		E _e = 0	Ch0			1	counts
			Ch1			1	
		λ _p = 640 nm E _e = 72 μW/cm ²	Ch0		155		
			Ch1		16		
		λ _p = 940 nm E _e = 140 μW/cm ²	Ch0		155		
			Ch1		139		
ADC count value ratio: Ch1/Ch0, standard mode		λ _p = 640 nm, E _e = 72 μW/cm ²		0.070	0.106	0.175	
		λ _p = 940 nm, E _e = 140 μW/cm ²		0.70	0.88	1.20	
R _e Irradiance responsivity, standard mode		λ _p = 640 nm E _e = 72 μW/cm ²	Ch0		11.1		counts/ (μW/cm ²)
			Ch1		1.2		
		λ _p = 940 nm E _e = 140 μW/cm ²	Ch0		5.7		
			Ch1		5		
R _v Illuminance responsivity, standard mode		Fluorescent light source: 300 Lux	Ch0		2.8		counts/ lux
			Ch1		0.23		
		Incandescent light source: 50 Lux	Ch0		19		
			Ch1		13		
(Sensor Lux) / (actual Lux), standard mode (Note 5)		Fluorescent light source: 300 Lux		0.65	1	1.35	
		Incandescent light source: 50 Lux		0.5	1	1.5	

- NOTES: 2. Optical measurements are made using small-angle incident radiation from light-emitting diode optical sources. Visible 640 nm LEDs and infrared 940 nm LEDs are used for final product testing for compatibility with high volume production.
3. The 640 nm irradiance E_e is supplied by an AlInGaP light-emitting diode with the following characteristics: peak wavelength λ_p = 640 nm and spectral halfwidth Δλ_{1/2} = 17 nm.
4. The 940 nm irradiance E_e is supplied by a GaAs light-emitting diode with the following characteristics: peak wavelength λ_p = 940 nm and spectral halfwidth Δλ_{1/2} = 40 nm.
5. The sensor Lux is calculated using the empirical formula shown on p. 11 of this data sheet based on measured Ch0 and Ch1 ADC count values for the light source specified. Actual Lux is obtained with a commercial luxmeter. The range of the (sensor Lux) / (actual Lux) ratio is estimated based on the variation of the 640 nm and 940 nm optical parameters. Devices are not 100% tested with fluorescent or incandescent light sources.

TSL2550 AMBIENT LIGHT SENSOR WITH SMBus INTERFACE

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AC Electrical Characteristics, $V_{DD} = 3.3\text{ V}$, $T_A = 25^\circ\text{C}$ (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_{(CONV)}$	Conversion time, per channel, standard mode			400		ms
$t_{(CONV)}$	Conversion time, per channel, extended mode			80		ms
$f_{(SMBCLK)}$	Clock frequency				100	kHz
$t_{(BUF)}$	Bus free time between start and stop condition		4.7			μs
$t_{(HDSTA)}$	Hold time after (repeated) start condition. After this period, the first clock is generated.		4			μs
$t_{(SUSTA)}$	Repeated start condition setup time		4.7			μs
$t_{(SUSTO)}$	Stop condition setup time		4			μs
$t_{(HDDAT)}$	Data hold time		300			ns
$t_{(SUDAT)}$	Data setup time		250			ns
$t_{(LOW)}$	SMBCLK clock low period		4.7			μs
$t_{(HIGH)}$	SMBCLK clock high period		4			μs
$t_{(TIMEOUT)}$	Detect clock/data low timeout		25		35	ms
t_F	Clock/data fall time				300	ns
t_R	Clock/data rise time				1000	ns
C_i	Input pin capacitance				10	pF