Operating Characteristics, High Gain (16x), VDD = 3.0 V, Ta = 25°C, (unless otherwise noted) (see Notes 2, 3, 4, 5)

Parameter	Symbol	Channel	Min	Typ	Max	Unit	Conditions
Oscillator frequency	fosc		690	735	780	kHz	
Dark ADC count value		Ch0	0		4	counts	Ee = 0, Tint = 402 ms
		Ch1	0		4		
Full scale ADC count value (Note 6)		Ch0			65535	counts	Tint > 178 ms
		Ch1			65535		
		Ch0			37177		Tint = 101 ms
		Ch1			37177		
		Ch0			5047		Tint = 13.7 ms
		Ch1			5047		
ADC count value		Ch0	750	1000	1250	counts	λp = 640 nm, Tint = 101 ms
		Ch1		200			Ee = 36.3 μW/cm^2
		Ch0	700	1000	1300		λp = 940 nm, Tint = 101 ms
		Ch1		820			Ee = 119 μW/cm^2
ADC count value ratio: Ch1/Ch0			0.15	0.2	0.25		λp = 640 nm, Tint = 101 ms
			0.69	0.82	0.95		λp = 940 nm, Tint = 101 ms
Irradiance responsivity	Re	Ch0		27.5		counts/ (μW/cm^2)	λp = 640 nm, Tint = 101 ms
		Ch1		5.5			
		Ch0		8.4			λp = 940 nm, Tint = 101 ms
		Ch1		6.9			
Illuminance responsivity	Rv	Ch0		36		counts/ lux	Fluorescent light source: Tint = 402 ms
		Ch1		4			
		Ch0		144			Incandescent light source: Tint = 402 ms
		Ch1		72			
ADC count value ratio: Ch1/Ch0				0.11			Fluorescent light source: Tint = 402 ms
				0.5			Incandescent light source: Tint = 402 ms
Illuminance responsivity, low gain mode (Note 7)	Rv	Ch0		2.3		counts/ lux	Fluorescent light source: Tint = 402 ms
		Ch1		0.25			
		Ch0		9			Incandescent light source: Tint = 402 ms
		Ch1		4.5			
(Sensor Lux) /(actual Lux), high gain mode (Note 8)			0.65	1	1.35		Fluorescent light source: Tint = 402 ms
			0.60	1	1.40		Incandescent light source: Tint = 402 ms

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 λp = 640 nm and spectral halfwidth $\Delta\lambda ½$ = 17 nm.
4. The 940 nm irradiance E_e is supplied by a GaAs light–emitting diode with the following characteristics: peak wavelength λp = 940 nm and spectral halfwidth $\Delta\lambda ½$ = 40 nm.
5. Integration time T_{int}, is dependent on internal oscillator frequency (f_{osc}) and on the integration field value in the timing register as described in the *Register Set* section. For nominal f_{osc} = 735 kHz, nominal T_{int} = (number of clock cycles)/f_{osc}.
   Field value 00: T_{int} = (11 x 918)/f_{osc} = 13.7 ms
   Field value 01: T_{int} = (81 x 918)/f_{osc} = 101 ms
   Field value 10: T_{int} = (322 x 918)/f_{osc} = 402 ms
   Scaling between integration times vary proportionally as follows:
   11/322 = 0.034 (field value 00), 81/322 = 0.252 (field value 01), and 322/322 = 1 (field value 10).
6. Full scale ADC count value is limited by the fact that there is a maximum of one count per two oscillator frequency periods and also by a 2–count offset.
   Full scale ADC count value = ((number of clock cycles)/2 - 2)
   Field value 00: Full scale ADC count value = ((11 x 918)/2 - 2) = 5047
   Field value 01: Full scale ADC count value = ((81 x 918)/2 - 2) = 37177
   Field value 10: Full scale ADC count value = 65535, which is limited by 16 bit register. This full scale ADC count value is reached for 131074 clock cycles, which occurs for T_{int} = 178 ms for nominal f_{osc} = 735 kHz.
7. Low gain mode has 16x lower gain than high gain mode: (1/16 = 0.0625).
8. For sensor Lux calculation, please refer to the empirical formula below. It is 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.

CH1/CH0	Sensor Lux Formula
0 < CH1/CH0 ≤ 0.50	Sensor Lux = (0.0304 x CH0) – (0.062 x CH0 x ((CH1/CH0)$^{1.4}$))
0.50 < CH1/CH0 ≤ 0.61	Sensor Lux = (0.0224 x CH0) – (0.031 x CH1)
0.61 < CH1/CH0 ≤ 0.80	Sensor Lux = (0.0128 x CH0) – (0.0153 x CH1)
0.80 < CH1/CH0 ≤ 1.30	Sensor Lux = (0.00146 x CH0) – (0.00112 x CH1)
CH1/CH0>1.30	Sensor Lux = 0

AC Electrical Characteristics (VDD = 3 V, Ta = 25°C)

PARAMETER†		MIN	TYP	MAX	UNIT
$t_{(CONV)}$	Conversion time	12	100	400	ms
$f_{(SCL)}$	Clock frequency	–	–	400	kHz
$t_{(BUF)}$	Bus free time between start and stop condition	1.3	–	–	µs
$t_{(HDSTA)}$	Hold time after (repeated) start condition. After this period, the first clock is generated.	0.6	–	–	µs
$t_{(SUSTA)}$	Repeated start condition setup time	0.6	–	–	µs
$t_{(SUSTO)}$	Stop condition setup time	0.6	–	–	µs
$t_{(HDDAT)}$	Data hold time	0	–	0.9	µs
$t_{(SUDAT)}$	Data setup time	100	–	–	ns
$t_{(LOW)}$	SCL clock low period	1.3	–	–	µs
$t_{(HIGH)}$	SCL clock high period	0.6	–	–	µs
t_F	Clock/data fall time	–	–	300	ns
t_R	Clock/data rise time	–	–	300	ns
C_j	Input pin capacitance	–	–	10	pF

† Specified by design and characterization; not production tested.