ML8511

UV Sensor with Voltage Output

GENERAL DISCRIPTION

The ML8511 is a UV sensor, which is suitable for acquiring UV intensity indoors or outdoors. The ML8511 is equipped with an internal amplifier, which converts photo-current to voltage depending on the UV intensity. This unique feature offers an easy interface to external circuits such as ADC. In the power down mode, typical standby current is 0.1μA, thus enabling a longer battery life.
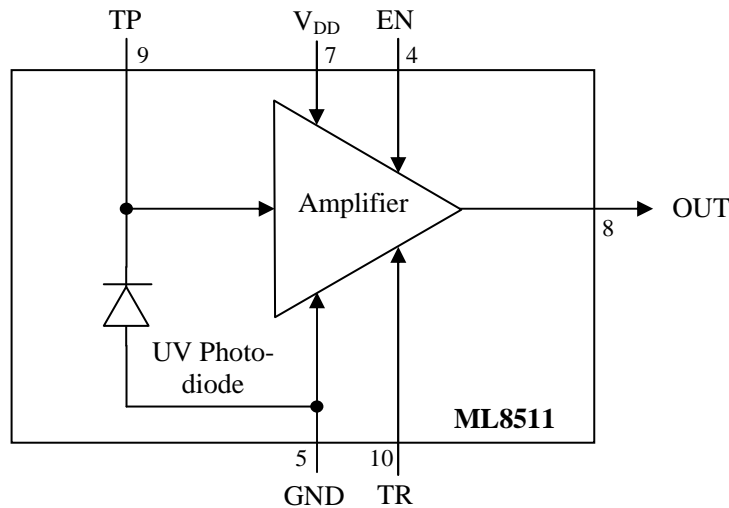
FEATURES

• Photodiode sensitive to UV-A and UV-B
• Embedded operational amplifier
• Analog voltage output
• Low supply current (300μA typ.) and low standby current (0.1μA typ.)
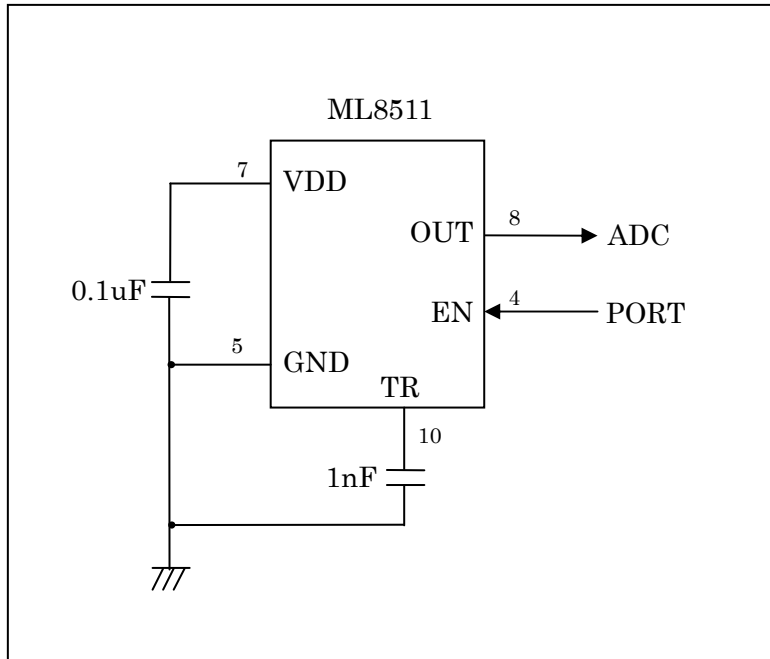• Small and thin surface mount package (4.0mm x 3.7mm x 0.73mm, 12-pin ceramic QFN)

APPLICATIONS

• Smart phone, Watch, Weather station,Bicycle navigation, Accessary, Gaming

BLOCK DAIAGRAM

PIN CONFIGURATIONS

Pin	Symbol	I/O	Function
7	VDD	PW	Supply voltage. Decouple this pin to ground with 0.1 μF capacitor.
5	GND	PW	Ground
4	EN	I	Active high enable pin. (High: Active mode, Low: Standby mode)
8	OUT	O	Output (Low in power down or standby mode)
9	TP	I/O	Test pin. Do not connect.
10	TR	I/O	Internal reference voltage. Decouple this pin to ground with 1 nF capacitor.
1,2,3, 6,11,12	NC	-	No Connection. Do not connect.

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EXAMPLE OF CONNCTING DIAGRAM

* Load resistance of OUT port is recommended more than 100 kΩ.

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ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Condition	Rating	unit
Supply Voltage	V_{DD}	Ta=25 °C	-0.3 to +4.6	V
Input Voltage	V_I	Ta=25 °C	-0.3 to +4.6	V
Output Short Current	I_{OS}	Ta=25 °C	5	mA
Power Dissipation	P_D	Ta=25 °C	30	mW
Storage Temperature	T_{stg}	-	-30 to +85	°C

RECOMENTED OPERATION CONDITIONS

Parameter	Symbol	Min.	Typ.	Max.	unit
Operating Voltage	V_{DD}	2.7	3.3	3.6	V
Operating Temperature	Ta	-20	-	70	°C

ELECTRO-OPTICAL CHARACTERISTICS

$(V_{DD}=+2.7V \text{ to } +3.6V, Ta= -20°C \text{ to } +70°C)$

Parameter	Symbol	Condition	Min.	Typ.	Max.	unit
Supply Current (active mode)	I_{DDA}	$V_{EN}=V_{DD}$	-	300	500	µA
Supply Current (standby mode)	I_{DDS}	$V_{EN}=0$	-	0.1	1	µA
Input Voltage (High level)	V_{IH}	-	$V_{DD} \times 0.8$	-	$V_{DD} + 0.3$	V
Input Voltage (Low level)	V_{IL}	-	-0.2	-	0.72	V
High level input current	I_{IH}	$V_{EN}=V_{DD}$	-	-	1	µA
Low level input current	I_{IL}	$V_{EN}=0$	-1	-	-	µA
Wavelength of maximum sensitivity	λp	Ta=25°C	-	365	-	nm
Output Setup Time	T_{SU}	$V_{EN}=V_{DD}$	-	-	1	ms
Output Voltage (Shading) *	V_{REF}	Ta=25°C, $V_{EN}=V_{DD}$	0.95	1.0	1.05	V
Output Voltage (10mW/cm^2 at λp) *	V_O	Ta=25°C, $V_{EN}=V_{DD}$	2.08	2.2	2.32	V

* Load resistance of OUT port is recommended more than 100 kΩ.

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OUTPUT VALTAGE– UV INTENSITY CHARCTERISTICS

V_{DD}=3.0V

Output Voltage (V) vs UV Intensity (mW/cm^2) @ λ365nm

- 75 ℃
- 25 ℃
- -5 ℃
- -25 ℃
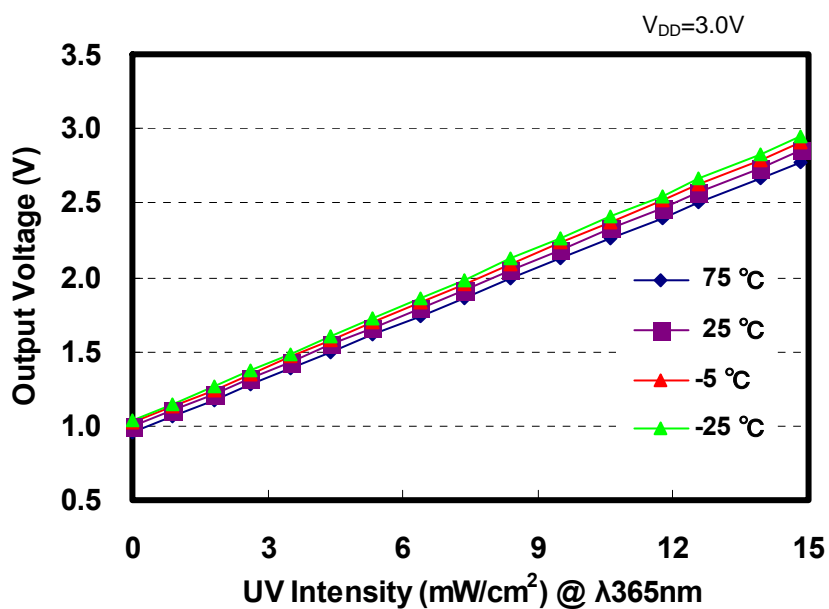
SPECTRAL RESPONSIVILITY CHARACTERISTICS

Ta=25°C, V_{DD}=3.0V

Relative Responsivity vs Wavelength (nm)
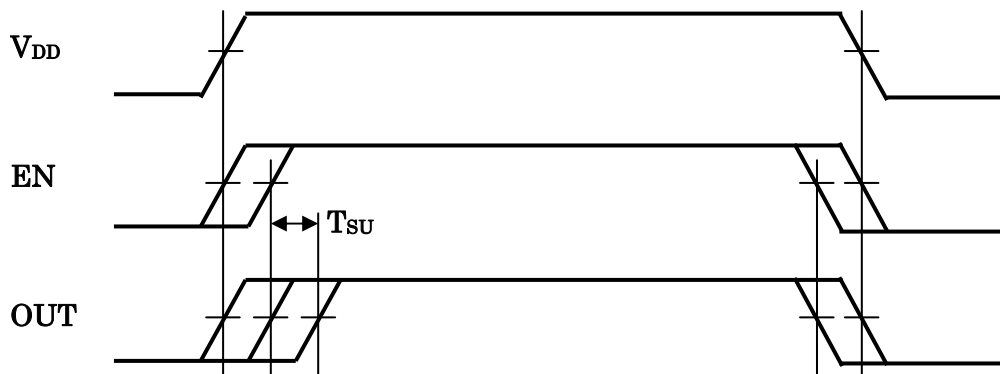
LAPIS Semiconductor Co.,Ltd.
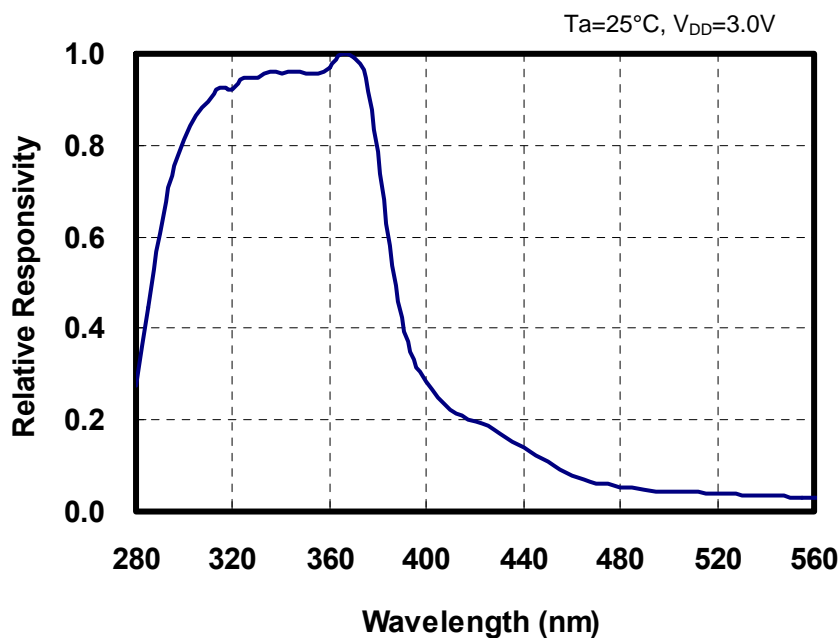
TIMING CHART

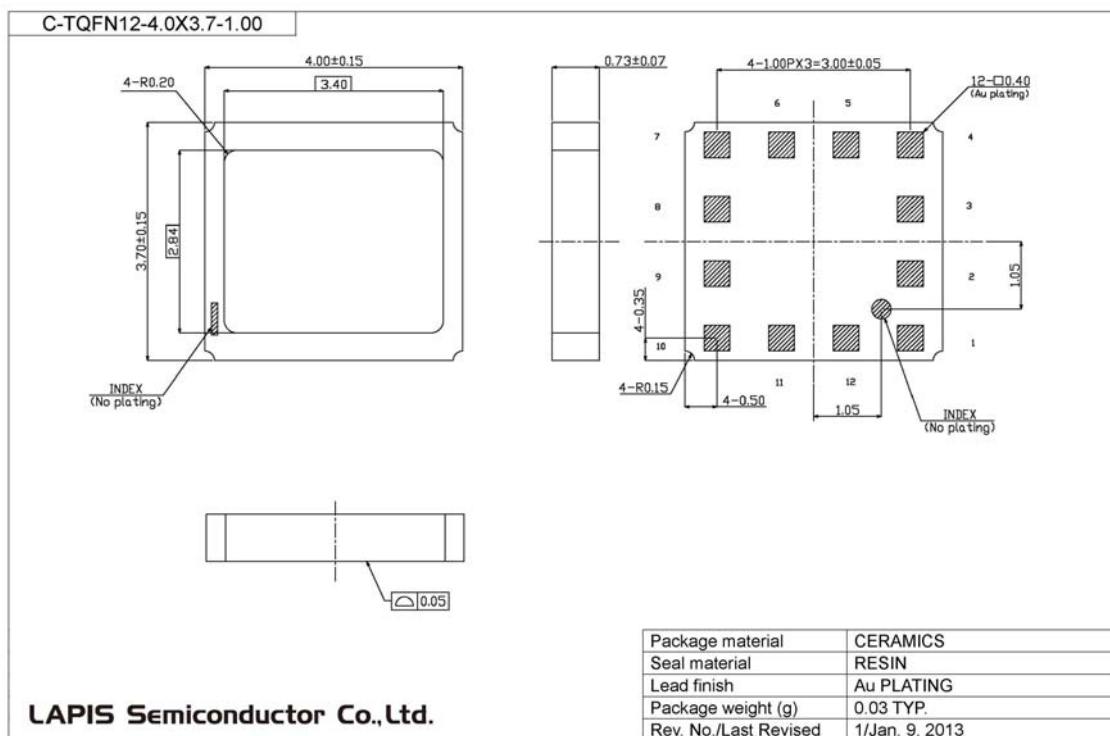Supply voltage and EN signal state should take one of the following procedures:
 1. EN should be HIGH or LOW at the same time when V_{DD} is applied.
 2. EN should be HIGH or LOW while V_{DD} is applied.

Output should be read after output voltage level becomes stable. Maximum time required until stable output voltage reaches is 1 millisecond after EN goes HIGH.

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PACKAGE DIMENTIONS

(Unit: mm)

Package material	CERAMICS
Seal material	RESIN
Lead finish	Au PLATING
Package weight (g)	0.03 TYP.
Rev. No./Last Revised	1/Jan. 9, 2013

Notes for Mounting the Surface Mount Type Package

The surface mount type packages are very susceptible to heat in reflow mounting and humidity absorbed in storage. Therefore, before you perform reflow mounting, contact our responsible sales person for the product name, package name, pin number, package code and desired mounting conditions (reflow method, temperature and times).

Specifications are defined without considering the UV absorption by an external cover material.
Please contact our sales representativeus when the cover material is applied.

Do not press or rub the surface of the resin covering the top of the package where, which is on the UV-ray is light received.
In addition, do not apply pressure at high temperature.

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REVISON HISTORY

Document No.	Date	Page		Description
		Previous Edition	Current Edition	
FEDL851100FC-01	Sep. 3, 2008	-		Preliminary edition
FEDL8511-02	Jan. 24, 2008	-	1	Added disclaimer
FEDL8511-03	Nov. 7, 2008	-	-	Changed Logo OKI to OKI SEMICONDUCTOR
		1	5	The following items has been moved: PACKAGE, NOTICE, PRECAUTION and DISCLAIMER.
		2	1	The following items have been moved: BLOCK DIAGRAM and PIN CONFIGRATION
		3	2	The following tables has been partially modified: RECOMMENDED OPERATING CONDITIONS ELECTRO-OPTICAL CHARACTERISTICS
		3	2	Changed load resistance 500 kΩ to 100 kΩ
		-	3	Added graphs
		-	4	Added "TIMING CHART"
FJDL8511-04	Jan. 17, 2013	1	1	Feature description is removed. Applications section is added.
		4	4	Explanation is provided to the timing chart.
		5	5	Package drawing is updated. Descriptions in the NOTE are modified. DISCLIMER is removed.
FJDL8511-05	Mar. 8, 2013	1	1	Descriptions in Pin configurations are modified.
		-	2	Example of connecting diagram is added.

NOTES

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