

# GP2TC1

## ■ Features

1. Adopted diffusive reflection method  
(Wide detecting range : 0 to 1.0mg/cm<sup>2</sup>)
2. Analog output according to amount of reflective light  
(adhesive volume of toner)
3. 2 system output : adhesive volume of black toner  
adhesive volume of color toner
4. Detection range of toner density  
(Y, M, C : 0 to 1.0mg/cm<sup>2</sup>)  
(K : 0 to 0.6mg/cm<sup>2</sup>)
5. High resolution (0.1mg/cm<sup>2</sup>)
6. Output can be adjusted by control of LED current

## ■ Applications

1. Full-color copiers
2. Color LBPs

## ■ Absolute Maximum Ratings

(Ta=25°C, Vcc=5V)

Parameter	Symbol	Rating	Unit
Operating voltage	V <sub>cc</sub>	-0.3 to 7	V
LED current	I <sub>F</sub>	50	mA
Output terminal voltage	V <sub>O</sub>	-0.3 to V <sub>cc</sub> +0.3	V
Operating temperature	T <sub>opr</sub>	0 to +60	°C
Storage temperature	T <sub>stg</sub>	-20 to +70	°C

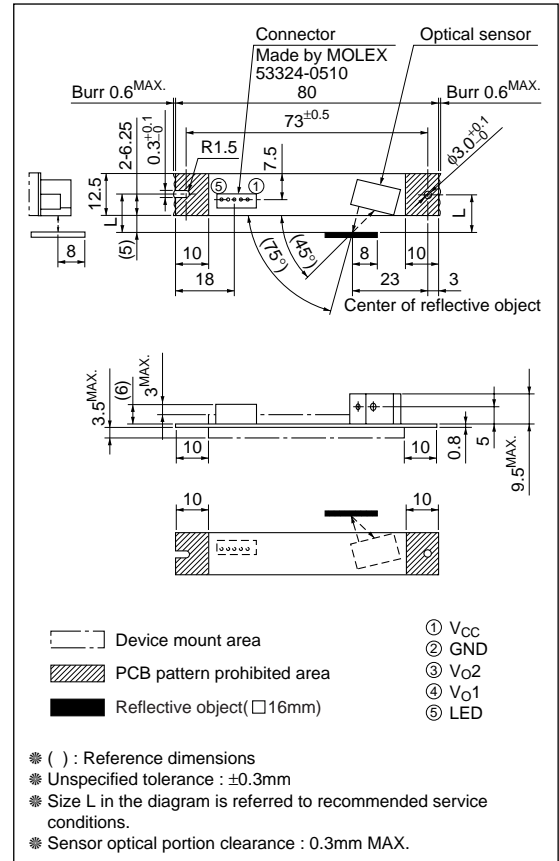
## ■ Recommend Operating Conditions

Parameter	Symbol	Rating	Unit
Supply voltage	V <sub>cc</sub>	4.5 to 5.5	V
Detection distance range	L	11.0 to 11.5	mm

## Color Toner Density (Adhesive Volume) Sensor by Diffusive Reflection Method

### ■ Outline Dimensions

(Unit : mm)



■ Electro-optical Characteristics

(Ta=25°C, Vcc=5V)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output voltage	Vo1A	Reflective object A (IFM=20mA)	0.70	1.06	1.42	V
	Vo2A		1.68	2.63	3.58	V
	Vo1o	LED current IFM=0mA	0.3	0.6	0.9	V
	Vo2o		0.3	1.1	1.9	V
Displacement of output voltage	$\Delta Vo1BA$	Displacement of output voltage Vo1 when reflective object is changed from A to B (IFM=20mA)	1.30	1.45	1.60	V
	$\Delta Vo2AC$	Displacement of output voltage Vo2 when reflective object is changed from C to A (IFM=20mA)	1.06	1.21	1.36	V
	$\Delta Vo1A0$	Vo1A-Vo1o	0.40	0.46	0.52	V
	$\Delta Vo2A0$	Vo2A-Vo2o	1.38	1.53	1.68	V
Rise time	tr	Reflective object C (Munsell N2 no gloss (Reflectivity 3.1%)) (IFM=20mA)	-	70	300	$\mu$ s
Fall time	tf		-	70	300	$\mu$ s
Consumption current	Icc	Consumption current at LED current IFM=0mA	-	4	12	mA

Fig.1 Internal Block Diagram

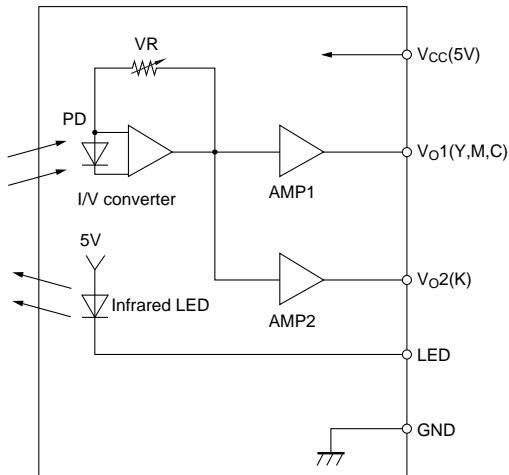


Fig.2 Schematic measurement block diagram

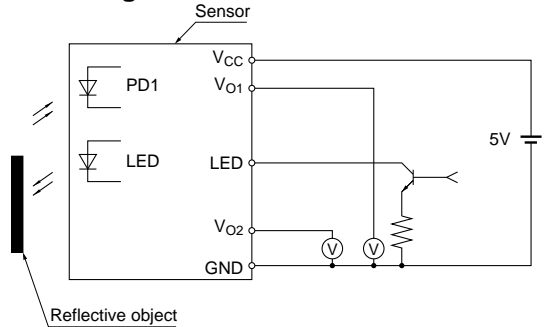


Fig.3 LED lighting condition

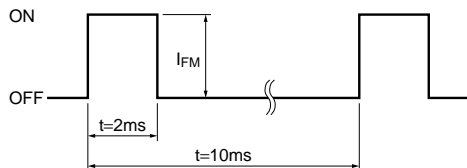


Fig.4 Response Time

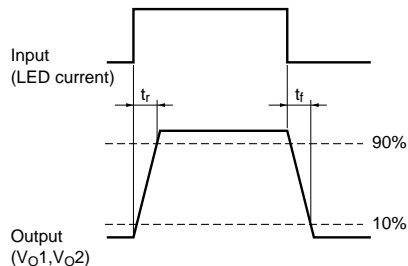
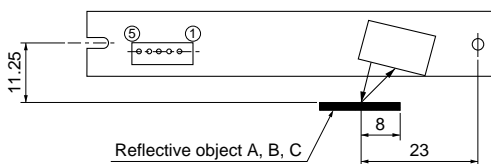


Fig.5 Measurement Condition



Reflective object A : Munsell N4.5 No gloss (Reflectivity 15.6%)  
 Reflective object B : Munsell N7.75 No gloss (Reflectivity 54.8%)  
 Reflective object C : Munsell N2 No gloss (Reflectivity 3.1%)

## ■ Example of application

1. Apply  $V_{CC}=5V$  and measure  $V_{O10}$  at  $V_{O1}$ ,  $V_{O20}$  at  $V_{O2}$ .
2. In order to stabilize output voltage measure 3. to 5. on the LED lighting condition shown in Fig.3 for example.
3. Measure the output voltage  $V_{O2}$  and adjust  $I_{FM}$  in order to fix  $\Delta V_{O21}$  (determine value by your actual application). After the adjustment, memorize the values,  $V_{O1}$ ,  $V_{O2}$  and  $I_{FM}$ , (If there are the initial memorized values,  $V_{O1}$ ,  $V_{O2}$  and  $I_{FM}$ , measure  $V_{O1}$  and  $V_{O2}$  at memorized  $I_{FM}$ . If there are difference between the measured values and memorized values adjust  $I_{FM}$  to let  $V_{O1}$  and  $V_{O2}$  be initial values.)
4. Attach the color toner and measure the output voltage at  $V_{O1}$  ( $I_{FM}$  at the value memorized at 3.). Determine the output voltage difference  $\Delta V_{O1}$  between the measured value and memorized value  $V_{O1}$  at 3, and adjust the attached color toner amount.
5. Attach the black toner and measure the output voltage at  $V_{O2}$  ( $I_{FM}$  at the value memorized at 3.). Determine the output voltage difference  $\Delta V_{O2}$  between the measured value and memorized value  $V_{O2}$  at 3, and adjust the attached black toner amount.
6. After the measurement, set  $I_{FM}=0mA$  and turn off the LED.
7. To measure them again, start from 1.

Note  $V_{O10}$  : Output voltage at  $I_{FM}=0mA$   
 $V_{O20}$  : Output voltage at  $I_{FM}=0mA$   
 $V_{O1}$  :  $V_{O1}$  terminal output voltage at no toner  
 $V_{O2}$  :  $V_{O2}$  terminal output voltage at no toner  
 $\Delta V_{O1}$  : Output voltage when black toner is attached- $V_{O1}$   
 $\Delta V_{O2}$  : Output voltage when black toner is attached- $V_{O2}$   
 $\Delta V_{O21}$  :  $V_{O2}-V_{O20}$   
 $I_{FM}$  : LED current

Fig.6 Output Voltage vs. Reflectivity of Reflective Objects

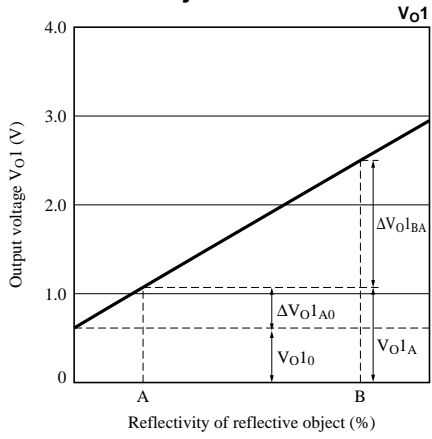
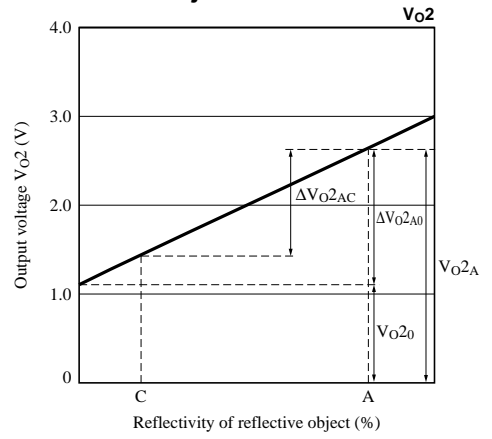


Fig.7 Output Voltage vs. Reflectivity of Reflective Objects



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