

SPECIFICATION

TITLE : Detection Sensor

PART NUMBER : GDET257

REVISION No. : 1.0

DATE : 15 Feb 2008

KAOS CO., LTD

Korea Advanced Optoelectronic Solutions

- ◎ This specification sheets include the contents under the copyright of KAOS CO., LTD ("KAOS"). Please keep them with reasonable care as important information. Please don't reproduce or cause anyone reproduce them without KAOS's content.
- ◎ Do not conduct reverse engineering such as dismantlement, analysis, etc. on this product without the consent of our firm. Please contact our firm directly when a problem is discovered and do not dismantle the product.
- ◎ Please understand that the standard or the look of this product for improvement purposes can be modified without an advance notice.
- ◎ Please obey the instructions mentioned below for actual use of this device.
- ① This device is designed for general electronic equipment.
 - Computer
 - OA equipment
 - AV equipment
 - Measuring instrument
 - Industrial Robot
 - Telecommunication equipment(Terminal), etc.
 - Home appliances
 - Machine tool
- ② Please take proper steps in order to maintain reliability and safety in case this device is used for the uses mentioned below which require high reliability.
 - Unit concerning control and safety a vehicle (air plane, train, automobile etc.)
 - Traffic signal
 - Fire box and burglar alarm box
 - Gas leak detection breaker
 - Other safety equipment, etc.
- ③ Please don't use for the uses mentioned below which require extremely high reliability.
 - Space equipment
 - Telecommunication equipment(Trunk)
 - Medical equipment (relating to any fatal element), etc.
 - Atomic energy control equipment

Feature

- Converts Light Intensity to Output Voltage
- Monolithic Silicon IC Containing Photodiode, Operational Amplifier, and Feedback Components
- High Sensitivity
- Single Voltage Supply Operation (2.7 V to 5.5 V)
- Low Noise (200 μ Vrms Typ to 1 kHz)
- Rail-to-Rail Output
- High Power-Supply Rejection (35 dB at 1 kHz)
- Compact 3-Leaded Metal Can Package(TO46)
- RoHS Compliant

Description

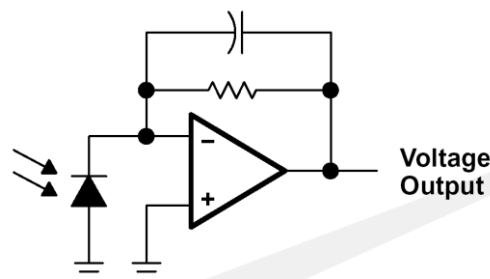
The GDET257 is a high-sensitivity low-noise light-to-voltage optical converter that combines a photodiode and a transimpedance amplifier on a single monolithic CMOS integrated circuit.

Output voltage is directly proportional to light intensity (irradiance) on the photodiode.

The GDET257 has a transimpedance gain of 320 M Ω .

The device has improved offset voltage stability and low power consumption and is supplied in a 3-lead metal can package with an integral lens.

When supplied in the lead (Pb) free package, the device is RoHS compliant.

Functional Block Diagram**Terminal Functions**

TERMINAL NAME	TERMINAL NO.	DESCRIPTION
GND	1	Ground (substrate). All voltages are referenced to GND.
Output	2	Output voltage
Vdd	3	Supply voltage

Absolute Maximum Ratings over operating free-air temperature range (unless otherwise noted)†

Supply voltage, VDD (see Note 1)	6 V
Output current, IO	±10 mA
Duration of short-circuit current at (or below) 25°C	5 s
Operating free-air temperature range, TA	-40°C to 105°C
Storage temperature range, Tstg	-55°C to 125°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	260°C

† 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.

NOTE 1: All voltages are with respect to GND.

Recommended Operating Conditions

PARAMETER	MIN	TYP.	MAX	UNIT
Supply voltage, VDD	2.7	5	5.5	V
Operating free-air temperature, TA	0	-	70	°C

Electrical Characteristics (Note1)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP.	MAX	UNIT
Dark voltage	Vd	Ee=0	0	-	15	mV
Maximum output voltage swing	Vom	Vdd=4.5V, No Load	-	4.49	-	V
		Vdd=4.5V, RL=10KΩ	4	4.2	-	V
Temperature coefficient of dark voltage (VD)	α _{vd}	Ta= 0°C ~ 70°C	-	-15	-	μV/°C
Output voltage	Vo	E e = 1.54 μW/cm ² , λ p = 470nm (Note 2)	1.6	2.0	2.4	V
Power supply rejection ratio	PSRR	fac=100hz (Note 3)	-	55	-	dB
		fac=1khz (Note 3)	-	35	-	dB

(Notes) 1. VDD = 5 V, TA = 25°C, λ p = 470nm, RL = 10 kΩ (unless otherwise noted)

2. Optical measurements are made using small-angle incident radiation from a light-emitting diode optical source.

3. Power supply rejection ratio (PSRR) is defined as 20 log (ΔV_{DD}(f)/ΔV_O(f)) with V_{DD}(f=0) = 5V and V_O(f=0) = 2V.

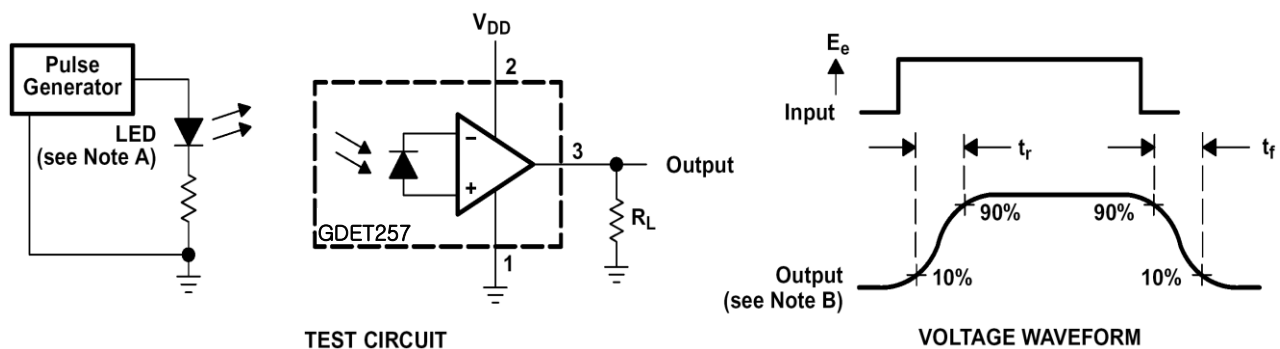
Switching Characteristics

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP.	MAX	UNIT
Output pulse rise time, 10% to 90% of final value	t_r	See Note 4 and Figure 1	-	160	250	μs
Output pulse fall time, 90% to 10% of final value	t_f	See Note 4 and Figure 1	-	150	250	μs
Output settling time to 1% of final value	t_s	See Note 4 and Figure 1	-	330	-	μs
Integrated noise voltage		$F=dc\sim 1kHz$, $E_e=0$	-	200	-	μV_{rms}
Output noise voltage, rms	V_n	$f=10Hz$, $E_e=0$	-	6	-	$\mu V/\sqrt{Hz}$ rms
		$f=100Hz$, $E_e=0$	-	6	-	
		$f=1kHz$, $E_e=0$	-	7	-	

(Notes) 4. $V_{DD} = 5V$, $T_A = 25^\circ C$, $\lambda_p = 470nm$, $R_L = 10k\Omega$ (unless otherwise noted)

Switching characteristics apply over the range $V_O = 0.1V$ to $4.5V$.

5. Please use this product avoiding the direct incidence of sunlight, fluorescent light or any other rays that include UV wavelength.

PARAMETER MEASUREMENT INFORMATION

NOTES: A. The input irradiance is supplied by a pulsed InGaN light-emitting diode with the following characteristics :

$\lambda_p = 470nm$, $t_r < 1 \mu s$, $t_f < 1 \mu s$.

B. The output waveform is monitored on an oscilloscope with the following characteristics :

$t_r < 100ns$, $Z_i \geq 1 M\Omega$, $C_i \leq 20pF$

Figure 1. Switching Times

TYPICAL CHARACTERISTICS

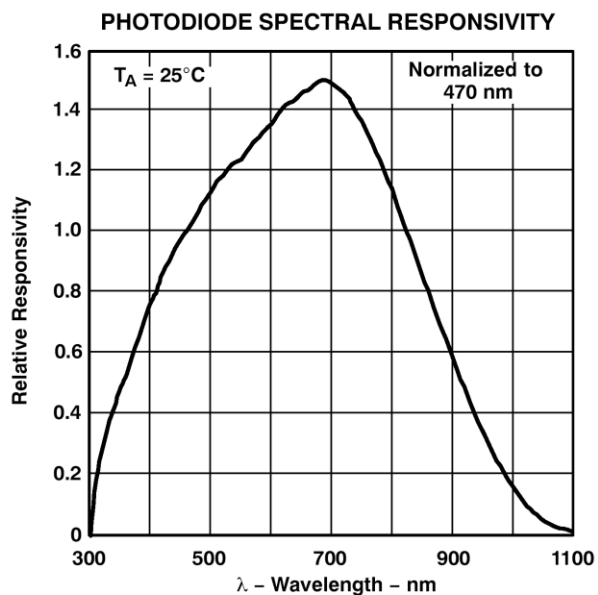


Figure 2

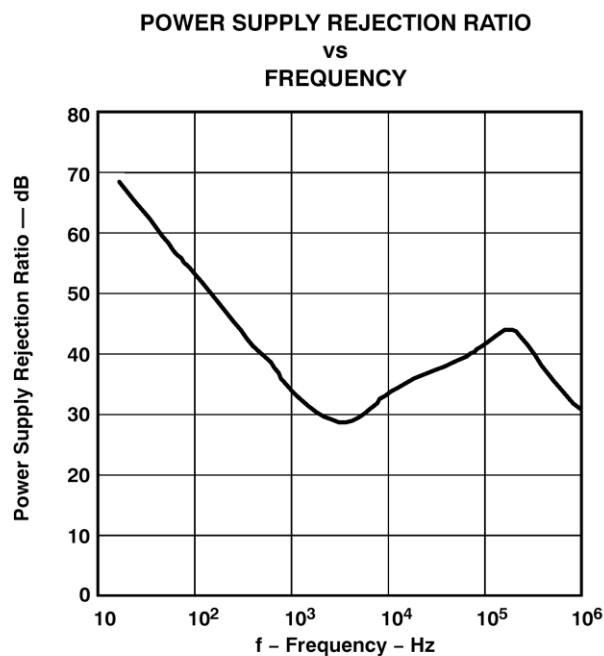


Figure 3

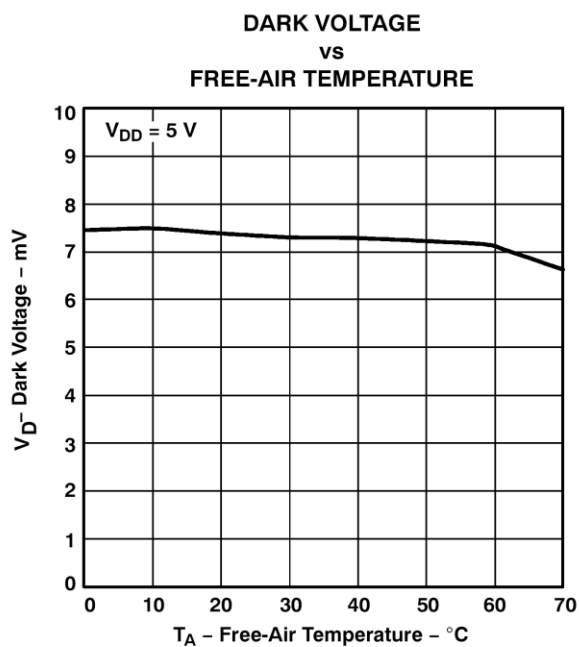


Figure 4

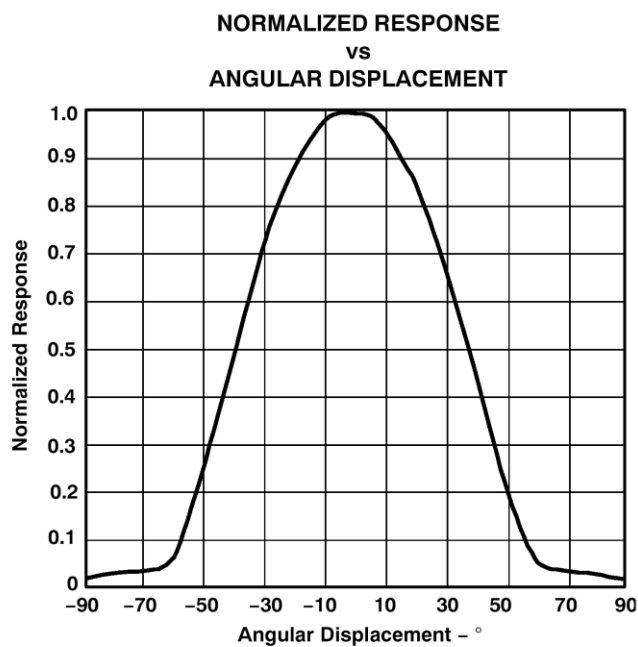
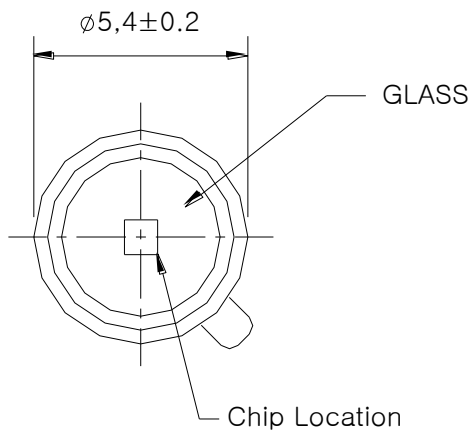
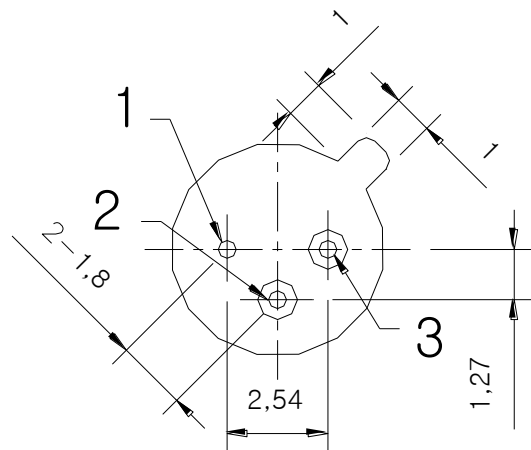
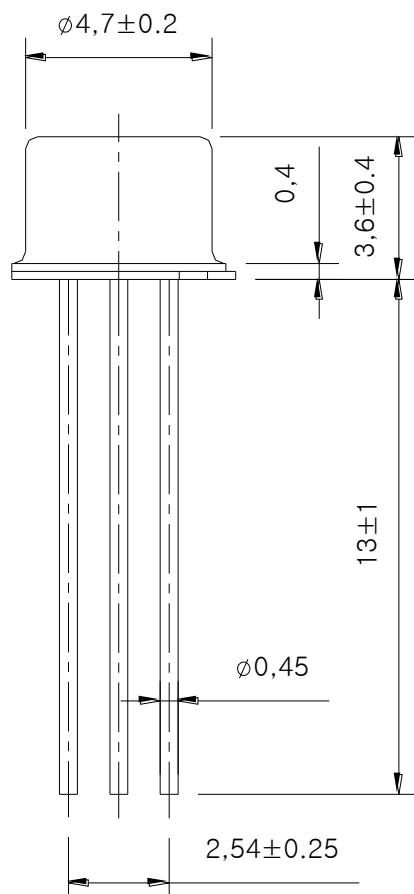


Figure 5

Top View

1 : GND
2 : Vout
3 : Vdd

Bottom ViewNOTE

1. All linear dimensions are in millimeters.
2. This drawing is subject to change without notice.
3. This product is composed of Metal Can included with Header and optical filter of T046.

Figure 6. Package dimension

CAUTION

1 . Lead Forming

- The location of bending shall be at least 3mm away from the root of Lead part.
- Avoid a Forming method where the root of Lead is the point of split.
- Put Lead Forming in effect before soldering.
- The root of Lead shall avoid bending or twisting. The quality of product could be damaged by twist.
- A fastening hole shall match with the Lead space precisely to attach onto a substrate. Fastening at a space where stress is applied onto Lead damages the Lead part and becomes the cause to lower the trust.

2 . Storage

- The time limit of the supplied storage shall be three months below 30℃ and under 70% R H.
If it shall exceed the limit, place them in a sealed container with desiccant (silica gel) with an expiration date of 1 year.
- Lead part is plated with gold. Being exposed to air containing corrosive gas deteriorates the gold-plated surface and can cause a problem during soldering. Give full attention to management of the air quality in storage and use in short period of time.
- Pay attention to management of air quality in storage to avoid the possibility of changes in the quality of spectrum sensitivity by the deterioration of plating film on Glass part with same shape.
- Store at a place with minimal temperature changes because sudden temperature changes cause dew condensation.

3 . Soldering

- Solder at least 3mm away from the root of Lead.
- Suggestions

Dipping		Soldering Iron	
Preliminary Heating	Below 120℃	Temperature at the tip of Iron	Below 350℃
Heating Time	Within 60 seconds	Time	Within 3 seconds
Soldering Temperature	Below 260℃		More than 3mm away from the root of Lead
Settling Time	Within 10 seconds		
Settling Location	More than 3mm away from the root of Lead		

- Do not apply stress when Lead is heated during soldering.
- Avoid the change of location after soldering as much as possible.
- Avoid any impact or shock on the sensor Cap part after soldering until the temperature of sensor returns normal.

·Attaching the sensor directly onto a substrate could cause bend the substrate or damage the Cap part when cutting or clinching the Lead, which is basically not possible to be covered in warranty, therefore please take caution in the operation.

When it is unavoidable, please use after checking thoroughly any possible damages such as wire snaps or damages on Cap part through the responsibility of our firm. Please do not attach onto a double-layered substrate because heat causes a direct influence onto the Cap part.

·Cutting Lead shall be done in normal temperature, or cutting in high temperature could cause an accident.

4 . Cleansing

·Use isopropyl alcohol for cleansing. When using other cleansers, please check carefully because using other types of cleanser could cause damage to Glass. Use of chlorofluorocarbon (CFC, Freon) type solvent is restricted all over the world.

·Please do not conduct ultrasonic cleaning fundamentally. First check the status during the operation because the influence on the sensor depending on the power output or the method of attachment of substrate could differ when ultrasonic cleaning starts.

5 . Handling of LENS Part

·Please take caution in handling the Lens part to avoid scratch or break .

6 . Period and Limit of Warranty

1) Warranty Period

·It shall be 1 year from the supply of the product to a designated location of your firm.

2) Warranty Limit

·We guarantee a limited warranty to supply a replaced product in case the product causes any failure due to the responsibility of our company within the warranty period. Also We ask for your understanding if there are any damages that might have incurred caused by the failure of the product.

7 . Other

- 1) This product is not designed with built-in radioactive rays, electromagnetic waves or heavy electronic particles.
- 2) For occurrence of any conflicts, both parties shall take efforts in settling the problem with a thorough discussion in good faith.
- 3) If the product has been used according to the details of this standard, any problems on safety shall not occur.
- 4) When used with a connection method meeting the standard, the main substrate would not be destroyed.
- 5) This product complies with EURO Restriction of Hazardous Substances(RoHS).