Features

- 3.2 x 2.7 SMD LED
- Close responsively to the human eye spectrum
- Light to Current, analog output
- Good output linearity across wide illumination range
- Low sensitivity variation across various light sources

Applications

- Detection of ambient light to control display backlighting
- Mobile devices
- Computing device
- Consumer device
- Automatic residential and commercial management
- Automatic contrast enhancement for electronic signboard
- Ambient light monitoring device for daylight and artificial light

Description

The IN-S32GTLS is a popular 3.2 x 2.7mm package with versatile design capabilities. It is a PCB type molding style LED which can be used in various applications.

Recommended Solder Pattern

![Recommended Solder Pattern](image)

Figure 1. IN-S32GTLS Solder Pattern

Package Dimensions in mm

![Package Dimensions](image)

Figure 2. IN-S32GTLS Package Dimensions

Notes:
1. All dimensions are in millimeters (inches).
2. Tolerance is ± 0.25 mm (.010”) unless otherwise noted.
Converting Photocurrent to Voltage

Notes:

1. The output voltage \( (V_{out}) \) is the product of photocurrent \( (I_{PH}) \) and loading resistor \( (R_L) \)

2. A right loading resistor shall be chosen to meet the requirement of maximum ambient light, and output saturation voltage:

\[
V_{out}(\text{max.}) = I_{PH}(\text{max.}) \times R_L \leq V_{out}(\text{saturation}) = V_{cc} - 0.4V
\]
Absolute Maximum Rating at 25°C

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameters</th>
<th>Ratings</th>
<th>Units</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>BVCEO</td>
<td>Collector-Emitter Breakdown Voltage</td>
<td>60</td>
<td>V</td>
<td>1</td>
</tr>
<tr>
<td>BVECO</td>
<td>Emitter-Collector Breakdown Voltage</td>
<td>4</td>
<td>V</td>
<td>2</td>
</tr>
<tr>
<td>Topr</td>
<td>Operating Temperature</td>
<td>-40~+85</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>Tstg</td>
<td>Storage Temperature</td>
<td>-40~+100</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>Tsol</td>
<td>Soldering Temperature</td>
<td>260</td>
<td>°C</td>
<td>3</td>
</tr>
</tbody>
</table>

Notes
1. Test conditions: IC=100μA, Ev=0 Lx.
2. Test conditions: IE=100μA, Ev=0 Lx.
3. Soldering time ≤ 5 seconds.

ESD Precaution

ATTENTION: Electrostatic Discharge (ESD) protection

The symbol above denotes that ESD precaution is needed. ESD protection for GaP and AlGaAs based chips is necessary even though they are relatively safe in the presence of low static-electric discharge. Parts built with AlInGaP, GaN, or/and InGaN based chips are STATIC SENSITIVE devices. ESD precaution must be taken during design and assembly.

If manual work or processing is needed, please ensure the device is adequately protected from ESD during the process.

Please be advised that normal static precautions should be taken in the handling and assembly of this device to prevent damage or degradation which may be induced by electrostatic discharge (ESD).
## Electro-Optical Characteristics

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameters</th>
<th>Test conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>λD</td>
<td>Rang Of Spectral Bandwidth</td>
<td>---</td>
<td>390</td>
<td>-</td>
<td>700</td>
<td>nm</td>
<td></td>
</tr>
<tr>
<td>λP</td>
<td>Wavelength Of Peak Sensitivity</td>
<td>---</td>
<td>-</td>
<td>630</td>
<td>-</td>
<td>nm</td>
<td></td>
</tr>
</tbody>
</table>
| BVCEO  | Collector-Emitter Breakdown Voltage | IC=100μA   
Ev=0 Lx | 60 | -   | -   | V     |       |
| BVCEO  | Emitter-Collector Breakdown Voltage | IE=100Ma   
Ev=0 Lx | 4  | -   | -   | V     |       |
| VCE(sat) | Collector-Emitter Saturation Voltage | IC=2mA   
Ev=1000 Lx | -  | -   | 0.4 | V     |       |
| ICEO   | Collector Dark Current | VCE=10V   
Ev=0 Lx | -  | -   | 100 | nA    |       |
| IPH1   | Light Current (1) | VCE=5V   
Ev=100 Lx | 5  | 30  | -   | μA    | 1     |
| IPH2   | Light Current (2) | VCE=5V   
Ev=1000 Lx | 50 | 300 | -   | μA    | 1     |
| IPH3   | Light Current (3) | VCE=5V   
Ev=1000 Lx | 150| 620 | -   | μA    | 2     |
| IPH4   | Light Current (4) | VCE=5V   
Ev=1000 Lx | 150| 790 | -   | μA    | 3     |
| Vo     | Saturation Output Voltage | Vcc=5V   
Ev= 1000 Lx , 
RL=75K | 4.5| 4.6 | -   | V     |       |

### Notes
1. White LED light (Color Temperature = 6500K) is used as light source.
2. Illuminance by CIE standard illuminant-A / 2856K, incandescent lamp.
3. Sunlight (Color Temperature = 4600K) is used as light source.
IN-S32GTLS
Ambient Light Sensor
Top View SMD 3.2x2.7 PCB Type

Typical Characteristic Curves

Spectral Sensitivity

- Relative Sensitivity (%)
- Wavelength (nm)

Light Current Output (μA)

Illuminance (Lux)

Vcc = 5V
- Incandescent Light
- White LED Light

Relative Light Current VS. V_{CE}

- Relative Light Current
- V_{CE} (V)

Light Current vs. Illuminance

- Light Current (μA)
- Illuminance (Lux)
## Ordering Information

<table>
<thead>
<tr>
<th>Product</th>
<th>Symbol</th>
<th>Parameters</th>
<th>Test conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
<th>Orderable Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN-S32GTLS</td>
<td>I PH1</td>
<td>Light Current (1)</td>
<td>$V_{CE}=5V, E_v=100 \text{ Lx}$</td>
<td>5</td>
<td>30</td>
<td>-</td>
<td>$\mu A$</td>
<td>IN-S32GTLS</td>
</tr>
<tr>
<td>IN-S32GTLS</td>
<td>I PH2</td>
<td>Light Current (2)</td>
<td>$V_{CE}=5V, E_v=1000 \text{ Lx}$</td>
<td>50</td>
<td>300</td>
<td>-</td>
<td>$\mu A$</td>
<td></td>
</tr>
<tr>
<td>IN-S32GTLS</td>
<td>I PH3</td>
<td>Light Current (3)</td>
<td>$V_{CE}=5V, E_v=1000 \text{ Lx}$</td>
<td>150</td>
<td>620</td>
<td>-</td>
<td>$\mu A$</td>
<td></td>
</tr>
</tbody>
</table>
# Label Specifications

## Inolux P/N:

<table>
<thead>
<tr>
<th>I</th>
<th>N</th>
<th>S</th>
<th>3</th>
<th>2</th>
<th>G</th>
<th>T</th>
<th>LS</th>
<th>-</th>
<th>-</th>
<th>-</th>
<th>-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inolux SMD</td>
<td>S = PCB Type</td>
<td>32G=3.2x2.7 1.1mm</td>
<td>T = Top Mount</td>
<td>(Blank) = Clear</td>
<td>U = Diffused</td>
<td>LS=Light sensor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Lot No.:

<table>
<thead>
<tr>
<th>Z</th>
<th>2</th>
<th>0</th>
<th>1</th>
<th>7</th>
<th>01</th>
<th>24</th>
<th>001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Tracker</td>
<td>Year (2017, 2018, ...)</td>
<td>Month</td>
<td>Date</td>
<td>Serial</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Packaging Information: 3000pcs Per Reel

Tape Dimension

<table>
<thead>
<tr>
<th>Dim. A</th>
<th>Dim. B</th>
<th>Dim. C</th>
<th>Qty/Reel</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.40±0.1</td>
<td>2.90±0.1</td>
<td>1.30±0.05</td>
<td>3K</td>
</tr>
</tbody>
</table>

Unit: mm

Reel Dimension
Packing Dimension

5 boxes per carton are available depending on shipment quantity.

<table>
<thead>
<tr>
<th>Specification</th>
<th>Material</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carrier tape</td>
<td>Per EIA 481-1A specs</td>
<td>Conductive black tape</td>
</tr>
<tr>
<td>Reel</td>
<td>Per EIA 481-1A specs</td>
<td>Conductive black</td>
</tr>
<tr>
<td>Label</td>
<td>IN standard</td>
<td>Paper</td>
</tr>
<tr>
<td>Packing bag</td>
<td>220x240mm</td>
<td>Aluminum laminated bag/ no-zipper</td>
</tr>
<tr>
<td>Carton</td>
<td>IN standard</td>
<td>Paper</td>
</tr>
</tbody>
</table>

Others:
Each immediate box consists of 5 reels. The 5 reels may not necessarily have the same lot number or the same bin. Each reel has a label identifying its specification; the immediate box consists of a product label as well.
Dry Pack

All SMD optical devices are MOISTURE SENSITIVE. Avoid exposure to moisture at all times during transportation or storage. Every reel is packaged in a moisture protected anti-static bag. Each bag is properly sealed prior to shipment.

Upon request, a humidity indicator will be included in the moisture protected anti-static bag prior to shipment.

The packaging sequence is as follows:

Reel  | Bag  | Outer Label
---|---|---
Inner Label  | Desiccant  | Zip-lock (Optional)

Reflow Soldering

- Recommended tin glue specifications: melting temperature in the range of 178~192°C
- The recommended reflow soldering profile is as follows (temperatures indicated are as measured on the surface of the LED resin):

Precautions
• Avoid exposure to moisture at all times during transportation or storage.
• Anti-Static precaution must be taken when handling GaN, InGaN, and AlInGaP products.
• It is suggested to connect the unit with a current limiting resistor of the proper size. Avoid applying a reverse voltage.
• Avoid operation beyond the limits as specified by the absolute maximum ratings.
• Avoid direct contact with the surface through which the LED emits light.
• If possible, assemble the unit in a clean room or dust-free environment.

Reworking
• Rework should be completed within 5 seconds under 260 °C.
• The iron tip must not come in contact with the copper foil.
• Twin-head type is preferred.

Cleaning
Following are cleaning procedures after soldering:
• An alcohol-based solvent such as isopropyl alcohol (IPA) is recommended.
• Temperature x Time should be 50°C x 30sec. or <30°C x 3min
• Ultra sonic cleaning: < 15W/ bath; bath volume ≤ 1liter
• Curing: 100 °C max, <3min

Cautions of Pick and Place
• Avoid stress on the resin at elevated temperature.
• Avoid rubbing or scraping the resin by any object.
• Electro-static may cause damage to the component. Please ensure that the equipment is properly grounded. Use of an ionizer fan is recommended.
## Reliability

<table>
<thead>
<tr>
<th>Item</th>
<th>Frequency/ lots/ samples/ failures</th>
<th>Standards Reference</th>
<th>Conditions</th>
</tr>
</thead>
</table>
| Precondition                      | For all reliability monitoring tests according to JEDEC Level 2 | J-STD-020           | 1.) Baking at 85°C for 24hrs  
2.) Moisture storage at 85°C/ 60% R.H. for 168hrs |
| Solderability                     | 1Q/ 1/ 22/ 0                     | JESD22-B102-B And CNS-5068 | Accelerated aging 155°C/ 24hrs  
Tinning speed: 2.5+0.5cm/s  
Tinning: A: 215°C/ 3+1s or B: 260°C/ 10+1s |
| Resistance to soldering heat      |                                  | CNS-5067            | Dipping soldering terminal only  
Soldering bath temperature  
A: 260+/−5°C; 10+/−1s  
B: 350+/−10°C; 3+/−0.5s |
| Operating life test               | 1Q/ 1/ 40/ 0                     | CNS-11829           | 1.) Precondition: 85°C baking for 24hrs  
85°C/ 60% R.H. for 168hrs  
2.) Tamb25°C; IF=20mA; duration 1000hrs |
| High humidity, high temperature bias | 1Q/ 1/ 45/ 0                 | JESD-A101-B         | Tamb: 85°C  
Humidity: 85% R.H., IF=5mA  
Duration: 1000hrs |
| High temperature bias             | 1Q/ 1/ 20                       | IN specs.           | Tamb: 55°C  
IF=20mA  
Duration: 1000hrs |
| Pulse life test                   | 1Q/ 1/ 40/ 0                     |                     | Tamb25°C, If=20mA, Ip=100mA, Duty cycle=0.125 (tp=125 µs,T=1sec)  
Duration 500hrs |
| Temperature cycle                 | 1Q/ 1/ 76/ 0                     | JESD-A104-A IEC 68-2-14, Nb | A cycle: -40 degree C 15min; +85 degree C 15min  
Thermal steady within 5 min..  
300 cycles  
2 chamber/ Air-to-air type |
| High humidity storage test        | 1Q/ 1/ 40/ 0                     | CNS-6117            | 60+3°C  
90+5/-10% R.H. for 500hrs |
| High temperature storage test     | 1Q/ 1/ 40/ 0                     | CNS-554             | 100+10°C for 500hrs |
| Low temperature storage test      | 1Q/ 1/ 40/ 0                     | CNS-6118            | -40+5°C for 500hrs |
### Revision History

<table>
<thead>
<tr>
<th>Changes since last revision</th>
<th>Page</th>
<th>Version No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Release</td>
<td></td>
<td>1.0</td>
<td>01-31-2019</td>
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</tbody>
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2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.