


## High Speed 10-channel Photo Detector IC

### FEATURES

- Dual wavelength 650 and 780nm
- Data channel bandwidth 130 MHz
- Eleven selectable gain settings covering 42dB range
- Group delay error less than 1ns up to 72MHz
- Slew rate up to 400V/us
- Small 16-pin OPLGA package

### APPLICATION

- DVD-RAM with CD-RW capability
- DVD-RW with CD-RW capability
- Writable data storage optical devices

|        |   |  |    |     |
|--------|---|--|----|-----|
| Vs     | 1 | <br>SP8056<br>16-Pin<br>OPLGA | 16 | Vcc |
| Gain 2 | 2 |  | 15 | RF+ |
| Gain 1 | 3 |  | 14 | RF- |
| Gain 3 | 4 |  | 13 | C   |
| EF     | 5 |  | 12 | B   |
| SAD    | 6 |  | 11 | D   |
| GH     | 7 |  | 10 | A   |
| SBC    | 8 |  | 9  | GND |

### GENERAL DESCRIPTION

The SP8056 is a ten channel photo detector IC (PDIC) specially designed for high speed DVD-RAM and DVD-RW applications and can operate at wavelength of 650 and 780 nm. The ten channels consist of four high speed channels (A, B, C, and D), two average speed channels (EF and GH), two slow channels (SAD and SBC), and two channels with paraphase output (RF+ and RF-). The EF and GH channels output is sum of signals from E + F and G + H sensors respectively. The RF channels output is sum of A + B + C + D + EF + GH channels with identical weights. Low noise operation enables data recovery at very low signal levels.

The SP8056 has three logic inputs for gain control, one of them operating as TTL compatible (Gain 1), and two other operating as three state logic inputs (Gain 2 and Gain 3). The allowable 14 logic states are used to select 11 gain factors, an adjustment mode, and a sleep mode (see table 4). Adjustment mode is used to adjust the position of the PDIC with respect to the laser beam. In this mode each of the sensors E, F, G, and H is connected to the input of EF, GH, SAD, and SBC channels respectively instead of the standard configuration.

In sleep mode all channels are in tri-state condition.

The SP8056 is manufactured with an advanced 10GHz BICMOS technology.

## GAIN MODE SELECTION

| Gain Mode                  | Gain Factor | Logic level |       |       |
|----------------------------|-------------|-------------|-------|-------|
|                            |             | Gain1       | Gain2 | Gain3 |
| RW-read                    | 128         | Low         | Low   | DC    |
|                            |             | Low         | Z     | Low   |
| R-read                     | 32          | Low         | Z     | High  |
|                            |             | Low         | High  | DC    |
| RW-write(speed 1)          | 16          | High        | Low   | High  |
| RW-write(speed 2)          | 12          | High        | Low   | Z     |
| RW-write(speed 3)          | 8           | High        | Low   | Low   |
| RW-write(speed 4)          | 6           | High        | Z     | Low   |
| R-write(speed 1)           | 4           | High        | Z     | High  |
| R-write(speed 2)           | 3           | High        | High  | Z     |
| R-write(speed 3)           | 2           | High        | High  | High  |
| R-write(speed 4)           | 1           | High        | High  | Low   |
| Adjustment mode            | 32          | High        | Z     | Z     |
| Sleep mode (output=High-Z) |             | Low         | Z     | Z     |

**Note:** DC - Don't Care, Z - High impedance

## PIN ASSIGNMENTS

| Pin # | Pin Name | Pin Function  |
|-------|----------|---|
| 1     | Vs       | Reference voltage. Bypass to GND with ceramic capacitor 0.1uF   |
| 2     | Gain 2   | Logic input of Gain Controller. Allows three states – low, high, and floating - Z                                       |
| 3     | Gain 1   | Logic input of Gain Controller. Allows two states – low and high  |
| 4     | Gain 3   | Logic input of Gain Controller. Allows three states – low, high and floating - Z  |
| 5     | EF       | Output of EF channel (sum of E + F sensor signals). In Adjustment mode it is output of E channel                        |
| 6     | SAD      | Output of SAD channel. In Adjustment mode it is output of F channel   |
| 7     | GH       | Output of GH channel (sum of G + H sensor signals). In Adjustment mode it is output of G channel                        |
| 8     | SBC      | Output of SBC channel. In Adjustment mode it is output of H channel   |
| 9     | GND      | Ground pin  |
| 10    | A        | Output of A channel   |
| 11    | D        | Output of D channel   |
| 12    | B        | Output of B channel   |
| 13    | C        | Output of C channel   |
| 14    | RF-      | Output of RF- channel. $RF- = -(A + B + C + D + EF + GH)$ . In Adjustment mode $RF- = -(A + B + C + D + E + F + G + H)$ |
| 15    | RF+      | Output of RF+ channel. $RF+ = A + B + C + D + EF + GH$ . In Adjustment mode $RF+ = A + B + C + D + E + F + G + H$       |
| 16    | Vcc      | Supply voltage. Bypass to GND with ceramic capacitor 0.1uF  |

## BOARD LAYOUT AND GROUNDING

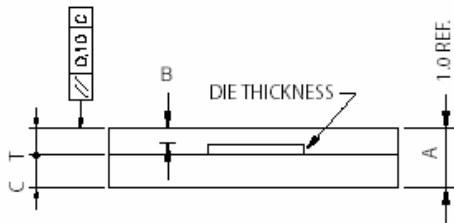
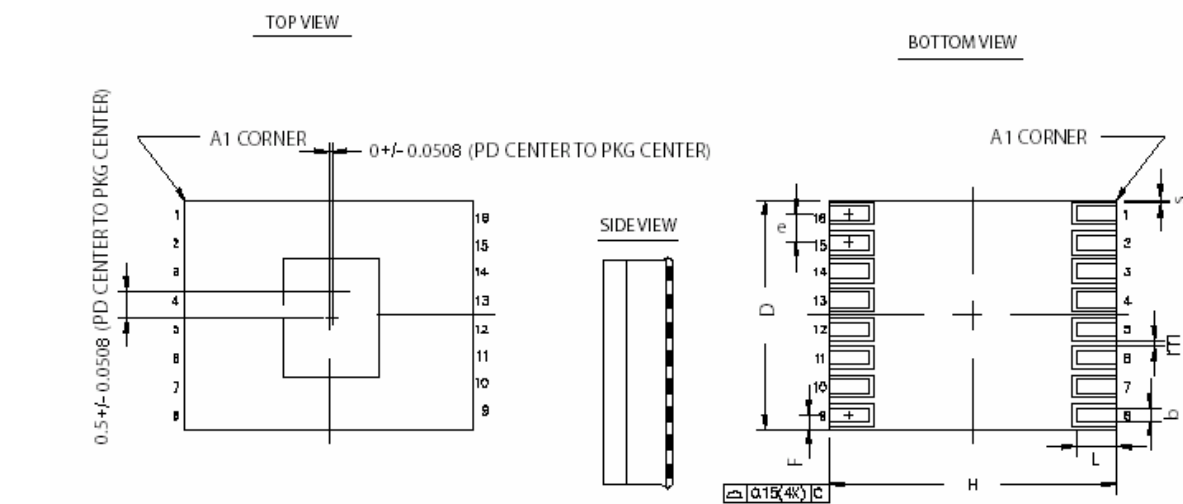
To obtain the best performance from the SP8056, a printed circuit board with ground plane is required. High quality, low series resistance ceramic 0.1uF bypass capacitors should be used at the Vcc and Vs pins (pins 1 and 16). These capacitors must be located as close to the pins as possible. The traces connecting the pins and the bypassing capacitors must be kept short and should be made as wide as possible.

Rev 1 (9-17-03): SP8056 – High Speed 10 Channel PDIC

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## OPLGA 16L PACKAGE DIMENSIONS



NOTE: DIE THICKNESS 0.2 mm (8MIL)

| SYMBOLS | DIMENSIONS IN MILLIMETERS |      |      |
|---------|---------------------------|------|------|
|         | MIN                       | NOM  | MAX  |
| A       | 0.90                      | 1.00 | 1.10 |
| b       | 0.20                      | 0.25 | 0.30 |
| C       | —                         | 0.56 | —    |
| D       | 3.90                      | 4.00 | 4.10 |
| B       | 0.19                      | —    | 0.32 |
| H       | 3.40                      | 3.50 | 3.60 |
| e       | —                         | 0.5  | —    |
| F       | 0.17                      | 0.25 | 0.33 |
| L       | 0.60                      | 0.7  | 0.80 |
| T       | —                         | 0.45 | —    |
| s       | 0.05                      | —    | —    |
| m       | 0.10                      | —    | —    |

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**SP8056**

**ORDERING INFORMATION**

| <b>Part number</b> | <b>Temperature range</b> | <b>Package Type</b>                    |
|--------------------|--------------------------|--|
| SP8056EG           | -30 + 80 <sup>0</sup> C  | 16-pin Optical Land Grid Array (OPLGA) |

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