



ADVANCED

SP8042

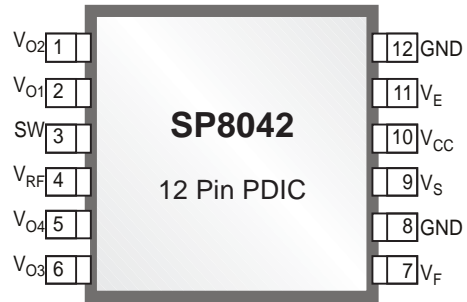
12 Channel, PDIC

#### FEATURES

- Suitable for dual wave length laser diode
- Compact package
- Optical light detector
- 6x read speed for DVD

#### APPLICATIONS

- DVD Player



## ABSOLUTE MAXIMUM RATINGS

|   |               |
|---|---------------|
| Supply Voltage, $V_{CC}$ .....  | 6.0V          |
| Output Voltage (This rating applies to $V_{O1}$ , $V_{O2}$ , $V_{O3}$ , $V_{O4}$ , $V_E$ and $V_F$ )..... | $V_{CC}$      |
| Operating Temperature, $T_{OPR}$ .....  | -30 to +80°C  |
| Storage Temperature, $T_{STG}$ .....  | -40 to +100°C |

These are stress ratings only and functional operation of the device at these ratings or any other above those indicated in the operation sections of the specifications below is not implied. Exposure to absolute maximum rating conditions for extended periods of time may affect reliability.

## RECOMMENDED OPERATING CONDITIONS

Unless otherwise noted:  $T_A = 25^\circ\text{C}$

| PARAMETER                                | SYMBOL   | MIN. | TYP. | MAX. | UNIT |
|--|----------|------|------|------|------|
| $V_{CC}$ recommended operating voltage 1 | $V_{CC}$ | 4.5  | 5.0  | 5.5  | V    |
| $V_S$ recommended operating voltage 2    | $V_S$    | 2.0  | 2.1  | 2.2  | V    |

## ELECTRICAL SPECIFICATIONS

Unless otherwise noted:  $V_{CC} = 5\text{V}$ ,  $V_S = 2.1\text{V}$ ,  $R_L = 10\text{k}\Omega$  (VRF:Open),  $C_L = 10\text{pF}$

| PARAMETER   | SYMBOL           | CONDITION                                       | MIN. | TYP. | MAX.  | UNIT              | APPLICABLE TERMINALS |
|---|------------------|---|------|------|-------|-------------------|----------------------|
| <b>3.3 Electro-optical characteristics 1:</b> 100% inspection items ( $V_{CC} = 5\text{V}$ , $V_S = 2.1\text{V}$ , $R_L = 10\text{k}\Omega$ (VRF:Open), $C_L = 10\text{pF}$ , $T_A = 25^\circ\text{C}$ )                |                  |   |      |      |       |                   |                      |
| Supply Current  | $I_{CC}$         | -   | -    | 23   | 30    | mA                | $V_{CC}$             |
| Output off-set voltage 1  | $V_{OD1}$        | Specified by voltage difference with $V_S$      | -25  | 0    | +25   | mV                | $V_{O1}$ to $V_{O4}$ |
| Output off-set voltage 2  | $V_{OD2}$        | Specified by voltage difference with $V_S$      | -25  | 0    | +25   | mV                | $V_E$ , $V_F$        |
| Output off-set voltage 3  | $V_{OD3}$        | GND reference                                   | 1.1  | 1.4  | 1.7   | V                 | $V_{RF}$             |
| Extremes of off-set voltage   | $\Delta V_{OD1}$ | $V_{O1} - V_{O2}$                               | -15  | 0    | +15   | mV                | $V_{O1}$ , $V_{O2}$  |
|   | $\Delta V_{OD2}$ | $V_{O3} - V_{O4}$                               | -15  | 0    | +15   | mV                | $V_{O3}$ , $V_{O4}$  |
|   | $\Delta V_{OD3}$ | $V_E - V_F$                                     | -15  | 0    | +15   | mV                | $V_E$ , $V_F$        |
| <b>3.4 Electro-optical characteristics 2:</b> Sampled; not 100% tested ( $V_{CC} = 5\text{V}$ , $V_S = 2.1\text{V}$ , $R_L = 10\text{k}\Omega$ [VRF:Open], $C_L = 10\text{pF}$ , Unspecified $T_A = 25^\circ\text{C}$ ) |                  |   |      |      |       |                   |                      |
| Maximum output voltage 1  | $V_{OH1}$        | -   | 3.8  | -    | -     | V                 | $V_{O1}$ to $V_{O4}$ |
| Maximum output voltage 2  | $V_{OH2}$        | -   | 3.8  | -    | -     | V                 | $V_{RF}$             |
| Output noise level 1  | $V_{N1}$         | $f = 18\text{MHz}$ , $\text{BW} = 30\text{kHz}$ | -    | -72  | -67   | dBm               | $V_{O1}$ to $V_{O4}$ |
| Output noise level 2  | $V_{N2}$         | $f = 18\text{MHz}$ , $\text{BW} = 30\text{kHz}$ | -    | -62  | -57   | dBm               | $V_{RF}$             |
| <b>Input Emitting Peak Wave Length <math>\lambda = 780\text{nm}</math></b>  |                  |   |      |      |       |                   |                      |
| Sensitivity 1 (Note 3,4)  | $R_{p1}$         | -   | 23.8 | 34.0 | 44.2  | mV/ $\mu\text{W}$ | $V_{O1}$ to $V_{O4}$ |
| Sensitivity 2 (Note 3,4)  | $R_{p2}$         | -   | 62.3 | 89.0 | 115.7 | mV/ $\mu\text{W}$ | $V_E$ , $V_F$        |
| Sensitivity 3 (Note 3,4)  | $R_{p3}$         | -   | 41.7 | 59.5 | 77.4  | mV/ $\mu\text{W}$ | $V_{RF}$             |
| Response Frequency 1 (Note 4,5,6)   | $fc1$            | -3dB  | 23   | 34   | -     | mHz               | $V_{O1}$ to $V_{O4}$ |
| Response Frequency 2 (Note 4,5,6)   | $fc2$            | -3dB  | 23   | 34   | -     | mHz               | $V_{O1}$ to $V_{O4}$ |
| Response Frequency 3 (Note 4,5,6)   | $fc3$            | -3dB  | 1    | 2    | -     | mHz               | $V_E$ , $V_F$        |
| Sensitivity Rresponse 1 (Note 4, 6)   | $\Delta R_{p1}$  | $f = 1$ to $18\text{MHz}$                       | -0.1 | +0.1 | +2.0  | dB                | $V_{O1}$ to $V_{O4}$ |
| Sensitivity Rresponse 2 (Note 4, 6)   | $\Delta R_{p2}$  | $f = 1$ to $18\text{MHz}$                       | -0.1 | +0.1 | +2.0  | dB                | $V_{RF}$             |

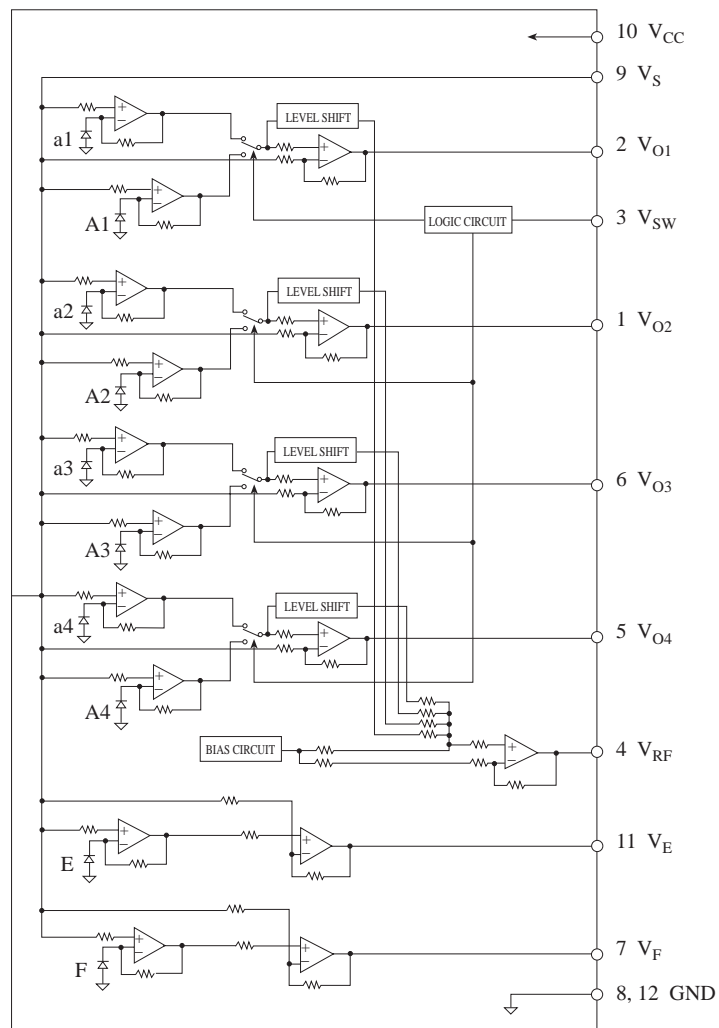
**ELECTRICAL SPECIFICATIONS: Continued**

| PARAMETER  | SYMBOL       | CONDITION         | MIN. | TYP. | MAX. | UNIT        | APPLICABLE TERMINALS               |
|--|--------------|-------------------|------|------|------|-------------|------------------------------------|
| Peaking 1 (Note 4, 6)  | $\Delta$ Rp3 | Reference at 1MHz | -    | -    | +3.0 | dB          | V <sub>O1</sub> to V <sub>O4</sub> |
| Peaking 2 (Note 4, 6)  | $\Delta$ Rp4 | Reference at 1MHz | -    | -    | +3.0 | dB          | V <sub>RF</sub>                    |
| Group Delay Deviation 1 (Note 4,6)                                       | tgd1         | f = 1 to 18MHz    | -    | 4.0  | 9.0  | ns          | V <sub>O1</sub> to V <sub>O4</sub> |
| Group Delay Deviation 2 (Note 4,6)                                       | tgd2         | f = 1 to 18MHz    | -    | 4.0  | 9.0  | ns          | V <sub>RF</sub>                    |
| <b>Input Emitting Peak Wave Length <math>\lambda=650\text{nm}</math></b> |              |                   |      |      |      |             |                                    |
| Sensitivity 4 (Note 3,4)   | Rp4          | -                 | 18.9 | 27.0 | 35.1 | mV/ $\mu$ W | V <sub>O1</sub> to V <sub>O4</sub> |
| Sensitivity 5 (Note 3,4)   | Rp5          | -                 | 50.8 | 72.5 | 94.3 | mV/ $\mu$ W | V <sub>E</sub> , V <sub>F</sub>    |
| Sensitivity 6 (Note 3,4)   | Rp6          | -                 | 33.1 | 47.0 | 61.5 | mV/ $\mu$ W | V <sub>RF</sub>                    |
| Response Frequency 4 (Note 4,5,6)  | fc4          | -3dB              | 25   | 36   | -    | MHz         | V <sub>O1</sub> to V <sub>O4</sub> |
| Response Frequency 5 (Note 4, 6)   | fc5          | -3dB              | 25   | 36   | -    | MHz         | V <sub>RF</sub>                    |
| Response Frequency 6 (Note 4,5,6)  | fc6          | -3dB              | 1    | 2    | -    | MHz         | V <sub>E</sub> , V <sub>F</sub>    |
| Sensitivity Rresponse 3 (Note 4, 6)                                      | $\Delta$ Rp5 | f = 1 to 18 MHz   | -0.1 | +2.0 | +3.0 | dB          | V <sub>O1</sub> to V <sub>O4</sub> |
| Sensitivity Rresponse 4 (Note 4, 6)                                      | $\Delta$ Rp6 | f = 1 to 18 MHz   | -0.1 | +2.0 | +3.0 | dB          | V <sub>RF</sub>                    |
| Peaking 3 (Note 4, 6)  | $\Delta$ Rp7 | Reference at 1MHz | -    | -    | +4.0 | dB          | V <sub>O1</sub> to V <sub>O4</sub> |
| Peaking 4 (Note 4, 6)  | $\Delta$ Rp8 | Reference at 1MHz | -    | -    | +4.0 | dB          | V <sub>RF</sub>                    |
| Group Delay Deviation 3 (Note 4,6)                                       | tgd3         | f = 1 to 18MHz    | -    | 4.0  | 9.0  | ns          | V <sub>O1</sub> to V <sub>O4</sub> |
| Group Delay Deviation 4 (Note 4,6)                                       | tgd4         | f = 1 to 18MHz    | -    | 4.0  | 9.0  | ns          | V <sub>RF</sub>                    |

Notes:

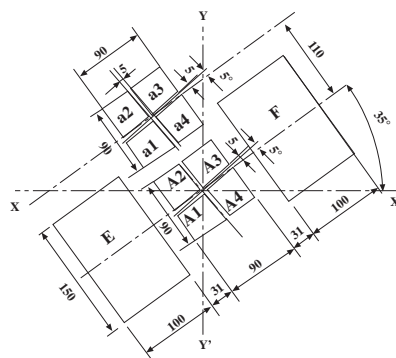
- 3.) 30  $\mu$ m and 5  $\mu$ W of DC lights applied to center of each photodiode under conditions defined as ? output voltage at above conditions defined as V<sub>p</sub> and the output voltage at dark V<sub>OD</sub>, the sensitivity R<sub>p</sub> is given by using the following formula:  $R_p = (V_p - V_{OD}) / 5\mu W$
- 4.) Laser diode light source,  $\lambda = 780\text{nm}$  or  $650\text{nm}$ .
- 5.) Frequency when sensitivity is 3dB, based on sensitivity at f=1MHz.
- 6.) 30 $\mu$ m and 10 $\mu$ W of DC light plus 4 $\mu$ W peak to peak of AC light applied to the center of each photodiode. BW = 10kHz.  
For V<sub>RF</sub> measurement, the signal light is irradiated on photodiode A and V<sub>RF</sub> measured.

## FUNCTIONAL DIAGRAM



## DETECTING PATTERN OF PHOTODIODE

(Unit:  $\mu\text{m}$ )





SIGNAL PROCESSING EXCELLENCE

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