



SANYO Semiconductors

DATA SHEET

LV0220CS — Monolithic Linear IC For Optical Pickups Front Monitor OE-IC

Overview

The LV0220CS is a front monitor optoelectronic IC for optical pickups that has a built-in photo diode compatible with three waveforms. A high-speed process is adopted, and high sensitivity and high reliability are obtained with 405nm AR coating cover glass. Moreover, LV0220CS is small size and thin type CSP packages.

Functions

- I-V amplifier with a built-in PIN type photo detector ($\phi = 0.7\text{mm}$) that supports three wavelengths
- Differential output amplifier
- Mode switching (BD/DVD/CD gain, volume output switching)

Specifications

Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$

| Parameter | Symbol | Conditions | Ratings | Unit |
|-----------------------------|----------------------|-------------------------------|------------|------------------|
| Maximum supply voltage | $V_{CC \text{ max}}$ | | 6 | V |
| Allowable power dissipation | $P_d \text{ max}$ | $T_a \leq 75^\circ\text{C}^*$ | 92 | mW |
| Operating temperature | T_{opr} | | -10 to +75 | $^\circ\text{C}$ |
| Storage temperature | T_{stg} | | -40 to +85 | $^\circ\text{C}$ |

* Mounted on a specified board: 20mm \times 20mm \times 1.6mm, glass epoxy board.

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LV0220CS

Recommended Operating Conditions at Ta = 25°C

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|-----------------------------|------------------|------------------|---------|------|-----------------|------|
| | | | min | typ | max | |
| Operating supply voltage | V _{CC} | | 4.5 | 5.0 | 5.5 | V |
| Operating reference voltage | V _{ref} | | 1.9 | 2.2 | 2.5 | V |
| Mode switch | CD | V _{swC} | 2.6 | | V _{CC} | V |
| | DVD | V _{swD} | 1.25 | 1.65 | 2.0 | V |
| | BD | V _{swB} | 0 | | 0.8 | V |
| Output load capacitance | C _o | | 12 | 20 | 33 | pF |
| Output load resistance | Z _o | | 3 | | | kΩ |

Electrical and Optical Characteristics at Ta = 25°C, V_{CC} = 5.0V, V_{ref} = 2.2V, R_L = 6kΩ, R_{in} = 1kΩ

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|--|----------------------------------|---|---------|------|------|-------|
| | | | min | typ | max | |
| Current dissipation | I _{CC} | | 9 | 13 | 17 | mA |
| Output offset voltage | V _{Ofs} | At shielding, voltage between OUT+ and - | -20 | 0 | +20 | mV |
| Output DC voltage | V _{Odc} | At shielding, OUT+ and - voltage, V _{ref} standard | -30 | 0 | +30 | mV |
| Temperature dependence of offset voltage * | V _{OfsT} | Ta = -10 to 85°C, at shielding | 20 | 50 | 80 | μV/°C |
| Optical output voltage * | V _{OC} | CD mode, λ = 780nm | 1.96 | 2.45 | 2.94 | mV/μW |
| | V _{OD} | DVD mode, λ = 650nm | 2.09 | 2.61 | 3.13 | mV/μW |
| | V _{OB} | BD mode, λ = 405nm | 0.83 | 1.04 | 1.25 | mV/μW |
| D range * | V _D | Voltage between OUT+ and - | 2200 | 2600 | | mV |
| Frequency characteristics * | f _{CC} | -3dB (1MHz reference), λ = 780nm | 24 | 30 | | MHz |
| | f _{CD} | -3dB (1MHz reference), λ = 650nm | 40 | 50 | | MHz |
| | f _{CB} | -3dB (1MHz reference), λ = 405nm | 40 | 50 | | MHz |
| Output noise voltage * | V _n | f = 30MHz, RBW = 30kHz, VBW = 100Hz, Blue mode | | -88 | -83 | dBm |
| Settling time * | T _{set} | | | 10 | | ns |
| Response time * | T _r , T _f | V _O = 0.9Vp-p, output level (10 to 90%), f _C = 10MHz, duty = 50% | | | 15 | ns |
| Response time difference * | ΔT _r , T _f | T _r -T _f , V _O = 0.9Vp-p, output level (10 to 90%), f _C = 10MHz, duty = 50% | -1.5 | | +1.5 | ns |
| Overshoot * | Ovst | V _O = 0.9Vp-p | | | 15 | % |
| Undershoot * | Unst | V _O = 0.9Vp-p | | | 15 | % |
| Linearity * | Lin | At output voltages 0.5V and 1.0V | -1 | | +1 | % |
| Wavelength dependence of output voltage | V _{of} | λ = 400 → 415nm | -2 | | 6 | % |

* : Parameters are design values for reference.

PD-wave length sensitivity ratio (when DVD = 1)

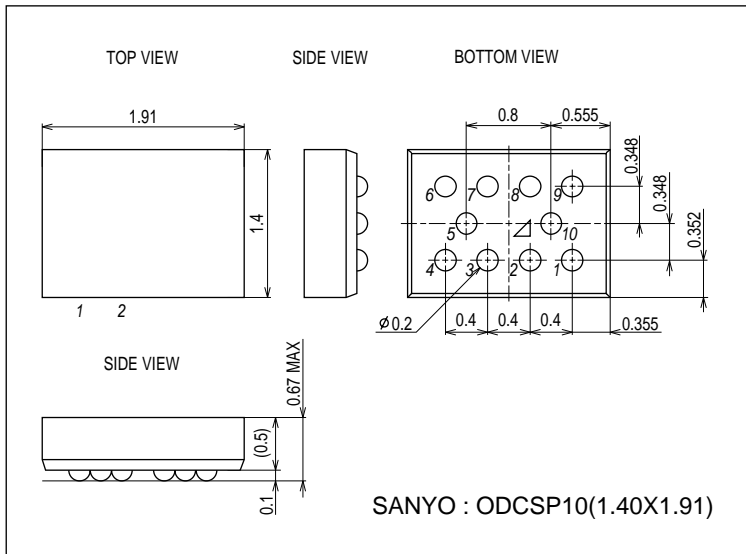
| | |
|------|-----|
| CD | 1.1 |
| DVD | 1.0 |
| Blue | 0.6 |

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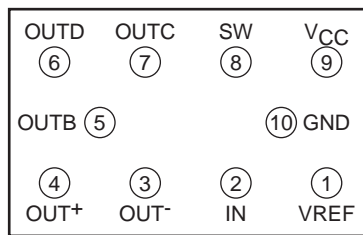
Package Dimensions

unit : mm (typ)

3352

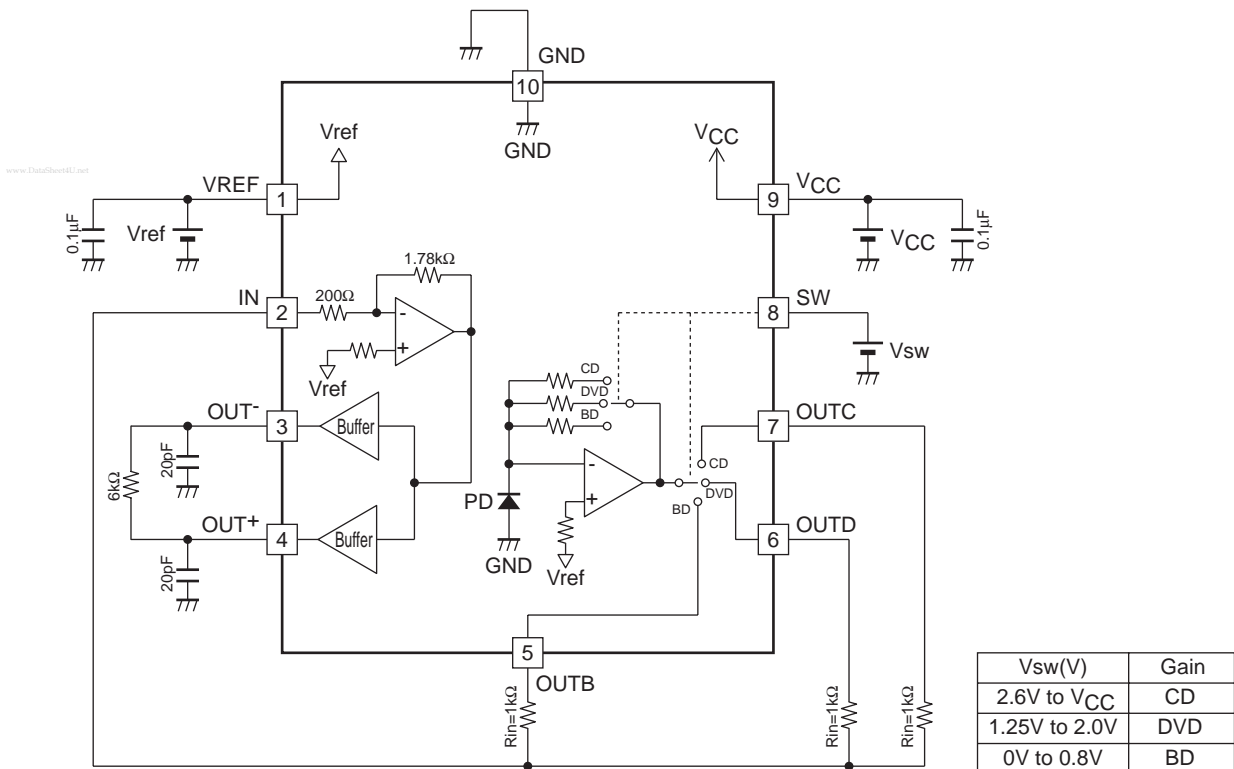


Pin Assignment



Bottom view

Block Diagram and Test Circuit Diagram



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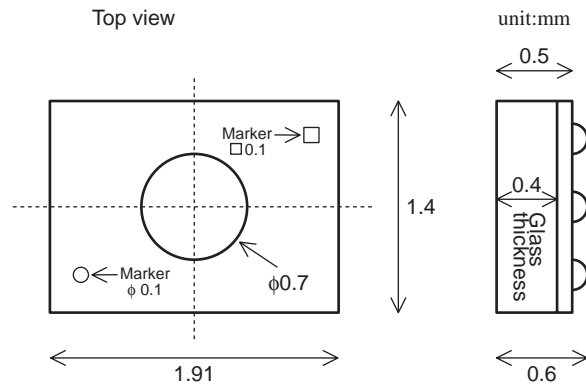
Pin Description

| Pin No. | Pin Name | Description | Equivalent Circuit |
|---------|----------|-------------------------------------|--------------------|
| 1 | VREF | Reference power supply voltage pin. | |
| 2 | IN | Differential output input-pin. | |
| 3 | OUT- | Negative side output pin. | |
| 4 | OUT+ | Positive side output pin. | |
| 5 | OUTB | Blue mode volume output pin. | |
| 6 | OUTD | DVD mode volume output pin. | |
| 7 | OUTC | CD mode volume output pin. | |
| 8 | SW | Mode switch pin. | |
| 9 | VCC | Power supply voltage pin. | |
| 10 | GND | Ground pin. | |

Photo-receiver Layout

PD aperture size $\phi = 0.7\text{mm}$

The center of PD corresponds to the center of the package



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