



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 $T_a = 25^\circ\text{C}$

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			k $\Omega$

## Electrical and Optical Characteristics at $T_a = 25^\circ\text{C}$ , $V_{CC} = 5.0\text{V}$ , $V_{ref} = 2.2\text{V}$ , $R_L = 6\text{k}\Omega$ , $R_{in} = 1\text{k}\Omega$

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 *	$V_{OfsT}$	$T_a = -10$ to $85^\circ\text{C}$ , at shielding	20	50	80	$\mu\text{V}/^\circ\text{C}$
Optical output voltage *	$V_{OC}$	CD mode, $\lambda = 780\text{nm}$	1.96	2.45	2.94	$\text{mV}/\mu\text{W}$
	$V_{OD}$	DVD mode, $\lambda = 650\text{nm}$	2.09	2.61	3.13	$\text{mV}/\mu\text{W}$
	$V_{OB}$	BD mode, $\lambda = 405\text{nm}$	0.83	1.04	1.25	$\text{mV}/\mu\text{W}$
D range *	$V_D$	Voltage between OUT+ and -	2200	2600		mV
Frequency characteristics *	$f_{cC}$	-3dB (1MHz reference), $\lambda = 780\text{nm}$	24	30		MHz
	$f_{cD}$	-3dB (1MHz reference), $\lambda = 650\text{nm}$	40	50		MHz
	$f_{cB}$	-3dB (1MHz reference), $\lambda = 405\text{nm}$	40	50		MHz
Output noise voltage *	$V_n$	$f = 30\text{MHz}$ , $\text{RBW} = 30\text{kHz}$ , $\text{VBW} = 100\text{Hz}$ , Blue mode		-88	-83	dBm
Settling time *	$T_{set}$			10		ns
Response time *	$T_r, T_f$	$V_O = 0.9\text{Vp-p}$ , output level (10 to 90%), $f_c = 10\text{MHz}$ , duty = 50%			15	ns
Response time difference *	$\Delta T_r, T_f$	$T_r - T_f$ , $V_O = 0.9\text{Vp-p}$ , output level (10 to 90%), $f_c = 10\text{MHz}$ , duty = 50%	-1.5		+1.5	ns
Overshoot *	$Ovst$	$V_O = 0.9\text{Vp-p}$			15	%
Undershoot *	$Unst$	$V_O = 0.9\text{Vp-p}$			15	%
Linearity *	$Lin$	At output voltages 0.5V and 1.0V	-1		+1	%
Wavelength dependence of output voltage	$V_{of}$	$\lambda = 400 \rightarrow 415\text{nm}$	-2		6	%

\* : Parameters are design values for reference.

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

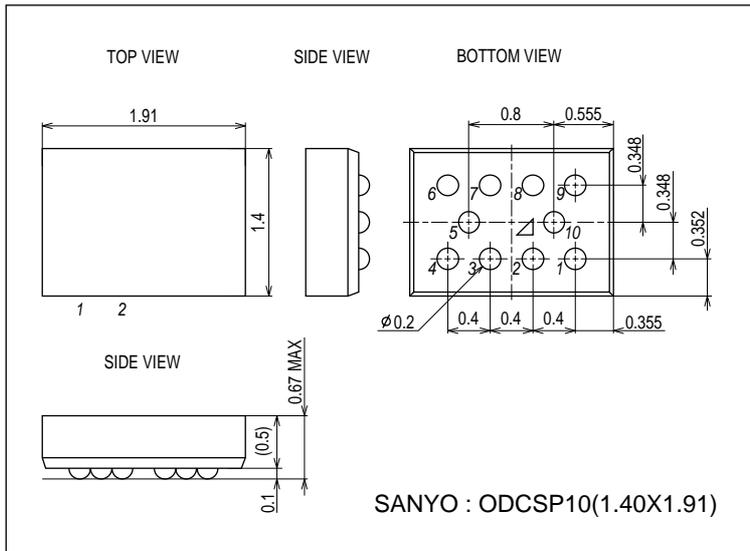
CD	1.1
DVD	1.0
Blue	0.6

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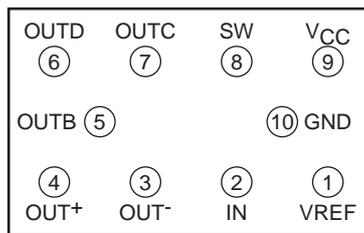
## Package Dimensions

unit : mm (typ)

3352

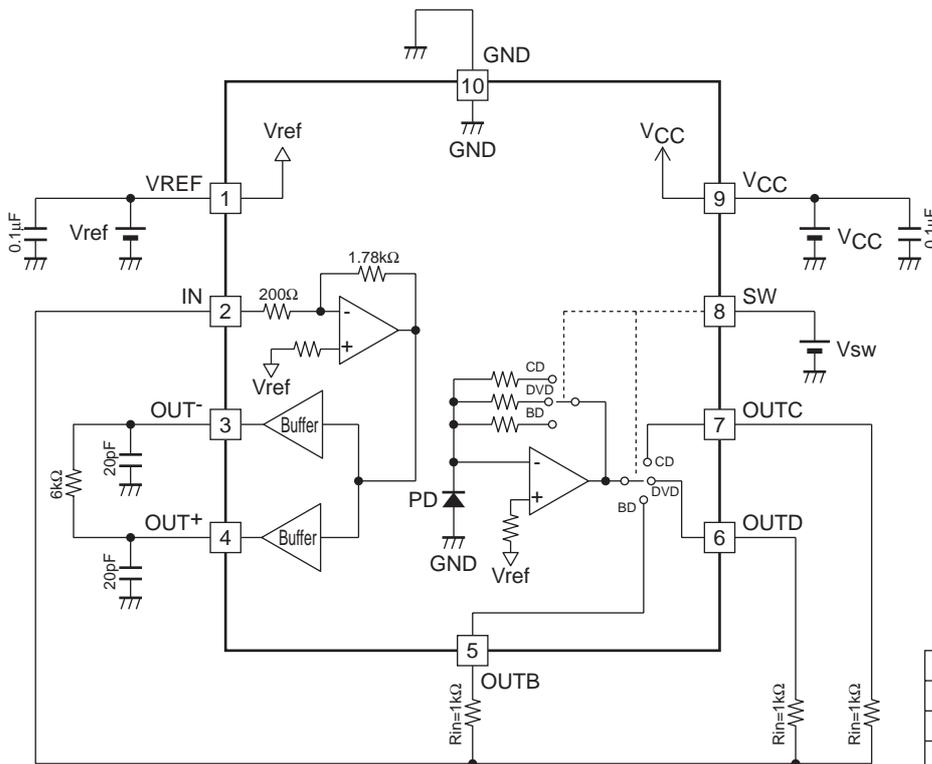


## Pin Assignment



Bottom view

## Block Diagram and Test Circuit Diagram



Vsw(V)	Gain
2.6V to VCC	CD
1.25V to 2.0V	DVD
0V to 0.8V	BD

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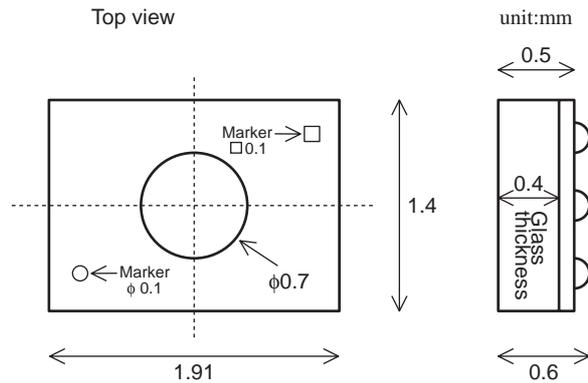
## Pin Description

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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