GH6CR05D3A

Resin Type Hologram Laser for Portable CD Player with Built-in 2V Operation OPIC※

■ Features

(1) With built-in 2V operation OPIC※
(2) With gain switching function for reading CD-RW media
(3) Insert frame structure enables easy mounting compared to conventional pin structure.
(4) Thin (4.8mm thickness) and compact package enables thin and compact pick-up design.
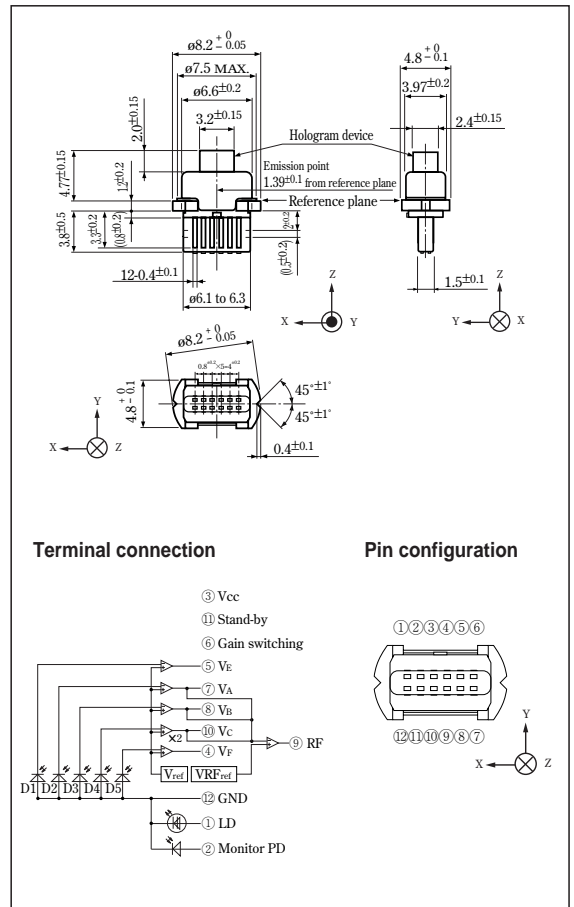(5) With built-in beam splitter and diffraction grating
    ※OPIC : (Optical IC) is a trademark of SHARP Corporation. An OPIC consists of a light-detecting element and a signal-processing circuit integrated onto a single chip.

■ Applications

(1) Portable CD players
(2) CD audio players
(3) Video CD players

■ Outline Dimensions

(Unit : mm)

Terminal connection

Pin configuration

■ Absolute Maximum Ratings

(T$_C$=25˚C)

	Parameter		Symbol	Rating	Unit
※1	Optical power output		P$_H$	4.3	mW
	Reverse voltage	Laser	V$_R$	2	V
		Monitor photodiode		30	V
	OPIC supply voltage		V$_{CC}$	6	V
※2	Operating temperature		T$_{opr}$	-10 to +70	˚C
※2	Storage temperature		T$_{stg}$	-40 to +85	˚C
※3	Soldering temperature		T$_{sold}$	260	˚C

※1 Output power from hologram laser, CW (Continuous Wave) drive
※2 Case temperature
※3 At the position of 0.5mm from the lead base (Within 5s)

■ Electro-optical Characteristics[11]

(Tc=25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
[1] Focal offset	DEF	V_{RF}=0.54V	-0.7	-	+0.7	μm
[2,8] Focal error symmetry	B_{FES}	V_{RF}=0.54V	-25	-	+25	%
[3,9] Radial error balance	B_{RES}	V_{RF}=0.54V	-25	-	+25	%
[4] RF output amplitude	V_{RF}	P_H=1.0mW	0.20	0.35	0.52	V
[2,6] FES output amplitude	V_{FES}	V_{RF}=0.54V	0.42	0.63	0.84	V
[3,7] RES output amplitude	V_{RES}	V_{RF}=0.54V	0.27	0.48	0.67	V
[2,10] A,B output top level	-	V_{RF}=0.54V	-	1.35	1.65	V
[3,10] E,F output top level	-		-	1.49	(1.85)	V
[4,10] RF output top level	-		0.15	0.38	-	V
Threshold current	I_{th}	−	-	13	18	mA
Operating current	I_{op}	P_H=2.5mW	-	17	27	mA
Operating voltage	V_{op}		-	1.9	2.2	V
[5] Wavelength	λ_P	P_o=3mW	770	785	795	nm
Output current	Im	P_H=2.5mW, V_R=15V	(0.01)	0.03	(0.09)	mA
[5] Differential efficiency	η_d	$\dfrac{2.0mW}{I(3.0mW)-I(1.0mW)}$	-	0.65	-	mW/mA
[5] Interference pattern intensity	α	P_o=2.0mW	-	-	0.99	-

[1] Distance between (A signal - V_{Aref})-(B signal - V_{Bref}) and jitter minimum point
At the condition of FES sensitivity = 20%/1μm(V_{Aref}, V_{Bref} is output voltage in defocus state, P_H = 1mW)

[2] Forcal vibration
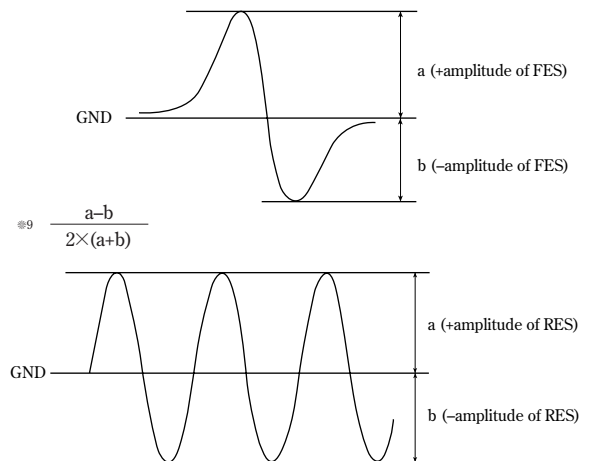
[3] Forcal servo ON, radial servo OFF

[4] Forcal servo ON, radial servo ON

[5] Without hologram device

[6] FES output = A signal - B signal(Forcal vibration)

[7] RES output = E signal - Fsignal(Forcal servo ON, phase difference of E signal and F signal is adjusted to be 180±5°.)
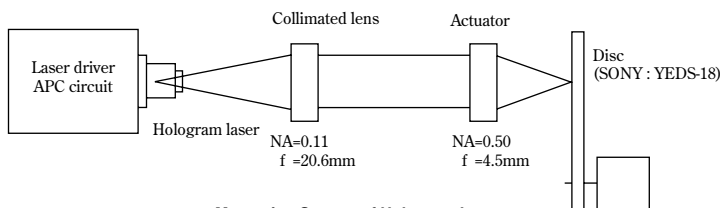
[8] (a–b) / (a+b)

[9] $\dfrac{a-b}{2\times(a+b)}$

GND
a (+amplitude of FES)
b (–amplitude of FES)

GND
a (+amplitude of RES)
b (–amplitude of RES)

[10] It is recommended that the maximum value of each top level is used at less than V_{CC} - 0.3V. If it goes beyond it, the linearity of output level is damaged, or malfunction is caused.

[11] Characteristics from focal offset to RF output top level is prescribed at low gain (G_L=0V).
As for the characteristics at high gain, please confirm at customers' side.

Laser driver APC circuit
Hologram laser
Collimated lens
NA=0.11
f =20.6mm
Actuator
NA=0.50
f =4.5mm
Disc (SONY : YEDS-18)

Measuring System of Hologram Laser

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■ Input Voltage Characteristics of Gain Switching Terminal and Stand-by Terminal (Design Standard*)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
[*1] Gain swicthing	High gain	G_H	–	1.5	-	V_{CC}	V
	Low gain	G_L		GND	-	0.5	V
Stand-by terminal	OPIC ON	S_{ON}	–	1.5	-	V_{CC}	V
	OPIC OFF	S_{OFF}		GND	-	0.5	V

[*1] Gain switching terminal   Input impedance : 120kΩ(Typ.)

                    Input voltage 0V : I_L=8μA(Typ.)

                                2V : I_H=8μA(Typ.)

■ Electro-optical Characteristics of Hologram Laser (Design Standard*)   (Tc=25℃)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Focal error signal capture range	-	–	-	12	-	μm
Focal error signal sensitivity	-	–	16	20	24	%/μm

■ Optical Characteristics of Hologram Device (Design Standard*)   (Tc=25℃)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Index of refraction	n	–	-	1.49	-	-
Transmissive wave aberration	-	P-V value	-	-	$\lambda/8$	nm

■ Electro-optical Characteristics of Laser Diode (Design Standard*)   (Tc=25℃)

Parameter			Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Emission characteristics	Symmetry	Parallel	S//	Po=3mW, Into NA=0.11	-25	-	+25	%
		Perpendicular	S⊥		-6.5	-	+6.5	
Misalignment position			Δx	–	-80	-	+80	μm
			Δy		-80	-	+80	
			Δz		-80	-	+80	
Z - position of emission point			z	From reference plane	-	1.39	-	mm

Parameter	Definition
S//	$\dfrac{(P_B + P_C) - (P_A + P_D)}{P_A + P_B + P_C + P_D}$
S⊥	$\dfrac{(P_A + P_B) - (P_C + P_D)}{P_A + P_B + P_C + P_D}$

P_X : Output of light detector X
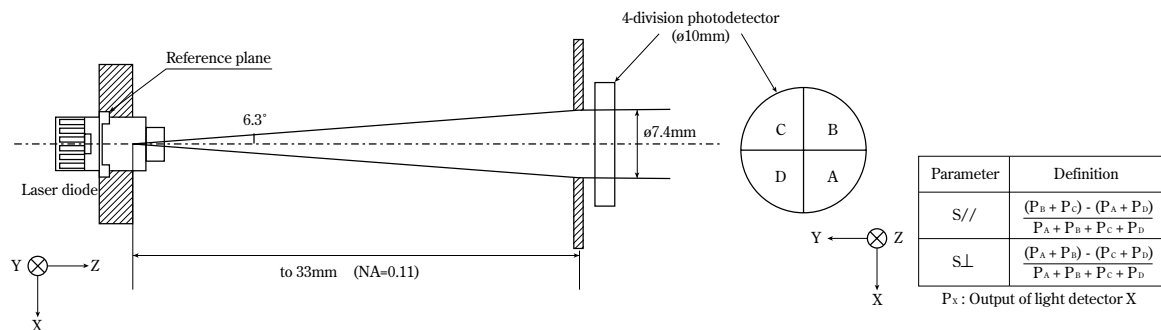
■ Electrical Characteristics of Monitor Photodiode (Design Standard*)   (Tc=25℃)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Dark current	I_D	V_R=15V	-	-	150	nA
Terminal capacitance	C_t		-	3.5	-	pF

* These parameters are not guaranteed performance, but general specifications of each optical element which makes up a hologram laser.

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■ **Electro-optical Characteristics of OPIC for Signal Detection (Design Standard*)** (Tc=25℃)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit	Segment
Supply voltage	V_{CC}	−	1.8	2	2.2	V	-
Output offset voltage (low gain)	V_{ODL}	V_{CC}=2V, No light	0.85	0.95	1.05	V	-
Output offset voltage (high gain)	V_{ODH}	V_{CC}=2V, No light	0.8	0.97	1.1	V	-
RF output offset voltage (low gain)	V_{RFDL}	V_{CC}=2V, No light	0.95	1.1	1.2	V	-
RF output offset voltage (high gain)	V_{RFDH}	V_{CC}=2V, No light	0.9	1.08	1.25	V	-
OPIC supply current (low gain)	I_{CCL}	−	2	3.7	6	mA	-
OPIC supply current (high gain)	I_{CCH}	−	2.1	3.9	6.5	mA	-
Stand-by OPIC supply current	I_{CC1}	STBY=2V	-	-	20	µA	-
Offset voltage difference (low gain)	V_{ODL}	V_{CC}=2V, No light	-22	0	+22	mV	V_A-V_B, V_E-V_F
Offset voltage difference (high gain)	V_{ODH}	V_{CC}=2V, No light	-70	0	+70	mV	V_A-V_B, V_E-V_F
Thermal drift of sensitivity (low gain)	RT_pL	Ta=-20 to +70℃	-	2 300	-	ppm/℃	V_A, V_B, V_C, V_E, V_F
Thermal drift of sensitivity (high gain)	RT_pH	Ta=-20 to +70℃	-	1 500	-	ppm/℃	V_A, V_B, V_C, V_E, V_F
RF response frequency (low gain)	FC_{RFL}	-3dB	9	13	-	MHz	-
RF response frequency (high gain)	FC_{RFH}	-3dB	2.6	6	-	MHz	-
Response frequency (low gain)	FC_0	(0.1MHz=0dB)	0.2	3	-	MHz	V_A, V_B, V_C, V_E, V_F
Response frequency (high gain)	FC_0	(0.1MHz=0dB)	0.2	2	-	MHz	V_A, V_B, V_C, V_E, V_F

* These parameters are not guaranteed performance, but general specifications of each optical element which makes up a hologram laser.

• Please refer to the chapter "Handling Precautions"

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