GH5RA1HA3C

(Under development)

Sampling Hold Method, High Power Output Hologram Laser for ×16 Speed CD-R Drive

■ Features

(1) High power output (pulse MAX. 144mW)
(2) For ×16 speed CD-R, ×40 speed CD-ROM
(With built-in MIN. 45MHz OPIC※)
(3) Sample hold system (tracking method)
(4) High coupling efficiency
The ellipticity (θ⊥/θ//) is close to 1.
(5) ϕ4.8mm thickness
(6) With built-in beam splitter and diffraction grating

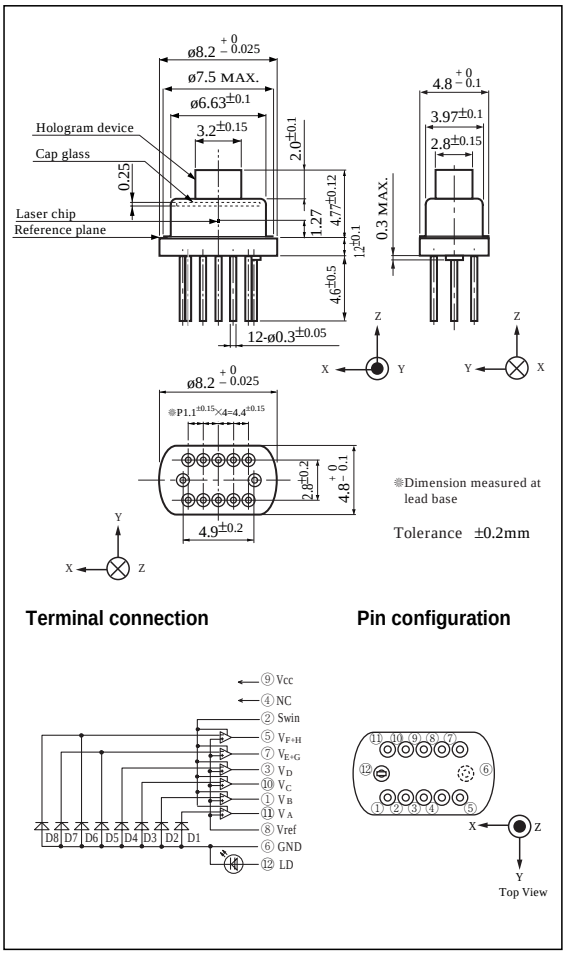
※OPIC : (Optical IC) is a trademark of SHARP Corporation. An OPIC consists of a light-detecting element and a signal-processing circuit integrated onto a single chip.

■ Applications

(1) CD-R drives
(2) CD-RW drives

■ Outline Dimensions

(Unit : mm)



■ Absolute Maximum Ratings

(TC=25˚C)

Parameter		Symbol	Rating	Unit
※1 Optical power output		PHC	101	mW
※2 Optical power output (pulse)		PHP	144	mW
Reverse voltage	Laser	VR	2	V
OPIC supply voltage		VCC	6	V
※3 Operating temperature		Topr	0 to +60	˚C
※3 Storage temperature		Tstg	-40 to +85	˚C
※4 Soldering temperature		Tsold	260	˚C

※1 Output power from hologram laser Equivalent to 120mW (CW) from cap glass
※2 Output power from hologram laser Equivalent to 160mW (pulse) from cap glass (pulse width : 0.5μs, Duty : 50%)
※3 Case temperature ※4 At the position of 1.6mm from the lead base (Within 5s)

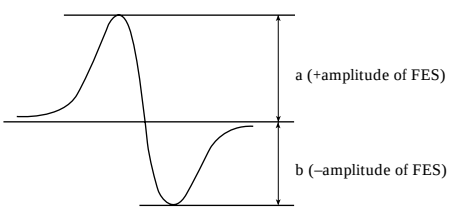
■ Electro-optical Characteristics

(T_C=25°C)

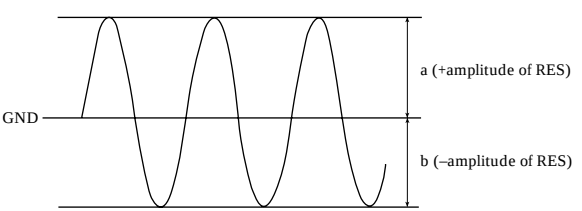
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
※1 Focal offset	DEF	Collimated lens output power 1.5mW, High gain	-0.7	-	+0.7	μm
※2 Focal error symmetry	B_{FES}	Collimated lens output power 1.5mW, High gain	-25	-	+25	%
※3 Radial error balance	B_{RES}	Collimated lens output power 1.5mW, High gain	-25	-	+25	%
※4 RF output amplitude	V_{RFH}	Collimated lens output power 1.5mW, High gain	0.32	0.47	0.62	V
※5 FES output amplitude	V_{FES}	Collimated lens output power 1.5mW, High gain	0.17	0.3	0.47	V
※6 RES output amplitude	V_{RES}	Collimated lens output power 1.5mW, High gain	0.04	0.1	0.15	V
※7 Main spot balance	MSB	Collimated lens output power 1.5mW, High gain	80	(100)	120	%
※8 Sub spot balance	SSB	Collimated lens output power 1.5mW, High gain	80	(100)	120	%
Jitter	JIT	Collimated lens output power 1.5mW, High gain	-	-	23	ns
※9 Strain of RF signal shape	RF_h	Collimated lens output power 1.5mW, High gain	-	-	230	%

※1 Distance between FES=0 and jitter minimum point

※2 (a–b) / (a+b)



※3 $\frac{a-b}{2\times(a+b)}$



※4 Amplitude of $V_A+V_B+V_C+V_D$ (focal servo ON, radial servo ON)

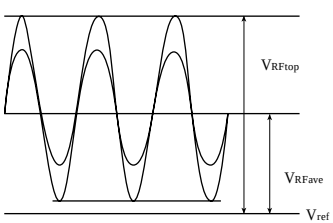
※5 $V_B–V_A$ (Focal vibration)

※6 Amplitude of $(V_C–V_D)–k1(V_{E+G}–V_{F+H})$. $k1=(V_C+V_D)/(V_{E+G}+V_{F+H})=1$
When tracking servo is ON, $(V_C–V_D)–k1(V_{E+G}–V_{F+H})+\alpha$ should be 0.

※7 (V_A+V_B) / (V_C+V_D)

※8 V_C/V_D

※9 V_{RFtop}/V_{RFave}



■ Electro-optical Characteristics of Laser Diode

(T_C=25°C)

Parameter			Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Threshold current			I_{th}	−	-	30	41	mA
Operating current			I_{op}	Po=100mW	-	130	155	mA
Operating voltage			V_{op}	Po=100mW	-	2.2	2.5	V
Wavelength			λ_p	Po=100mW	773	784	797	nm
Differential efficiency			η_d	$\frac{70mW}{I(100mW)-I(30mW)}$	0.7	0.85	1.2	mW/mA
Stability of differential efficiency			$\Delta\eta_d$	Po=10 to 150mW	-	-	40	%
Half intensity angle		Parallel	θ//	Po=100mW	7.5	9	10.5	°
		Perpendicular	θ⊥		14.5	17	19.5	°
Emission characteristics	Deviation angle	Parallel	ø//		-2	-	+2	°
		Perpendicular	ø⊥		-3	-	+3	°
Beam shift			Δø//	ø//(100mW)-ø//(3mW)	-1	-	+1	°
Kink			K-LI1	Po=10 to 150mW	0.988	-	-	%
			K-LI2	P1=30mW, P2=90mW, P3=150mW	-	-	15	%

■ Electro-optical Characteristics of OPIC for Signal Detection※10

(T_C=25°C, V_{CC}=5V, V_{ref}=2.1V)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit	※11 Segment
Supply current	I_{CC1}	High gain, Gain switching SW=H	-	20	25	mA	
	I_{CC2}	Low gain, Gain switching SW=L	-	30	35	mA	
※12 Output off-set voltage	V_{od}	Common to high/low gain, No light	-25	2	+25	mV	A, B
Off-set voltage difference, Gain switching	ΔV_{od}	Common to high/low gain	-30	-	+30	mV	A, B

※10 0.1µF or more capacitor should be added between OPIC power supply terminal and GND, Vref terminal and GND. (at the position of 5mm or less from the lead base)

※11 Applicable divisions correspond to output terminals.

A : V_A, V_B, V_C, V_D

B : V_{E+G}, V_{F+H}

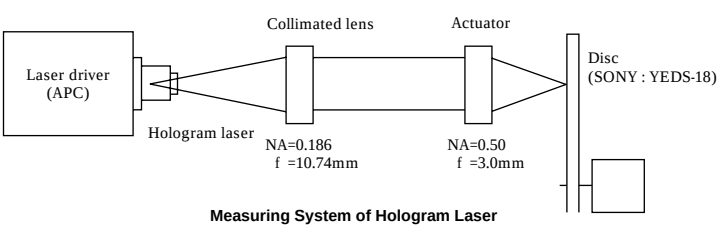
※12 Difference from V_{ref}

■ Electro-optical Characteristics of Hologram Laser (Design Standard*)※1

(T_C=25°C)

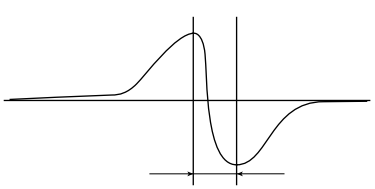
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
※2 Focal error signal capture range	-	−	-	14	-	µm
Focal error signal sensitivity	-	−	-	13	-	%/µm

※1



Measuring System of Hologram Laser

※2



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

■ Optical Characteristics of Hologram Device (Design Standard*)

(T_C=25°C)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Hologram diffraction efficiency	0 th	-	λ=780nm	77	82	-	%
	±1st	-		6	7	9	%
Hologram diffraction angle	D1,D2	-	λ=780nm	-	21.1	-	°
	Except D1,D2	-		-	26.4	-	°
Grating diffraction efficiency		-	0:1	6.7	9	12.4	-
Grating diffraction angle		-	λ=780nm	-	2.8	-	°

■ Electro-optical Characteristics of Laser Diode (Design Standard*)

(T_C=25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Misalignment position	Δx	−	-80	-	+80	μm
	Δy		-80	-	+80	μm
	Δz		-80	-	+80	μm
※3 Reflectivity of LD rear facet	R_r	−	85	-	-	%

■ Electro-optical Characteristics of OPIC for Signal Detection (Design Standard*)

(T_C=25°C, V_{CC}=5V, V_{ref}=2.1V)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit	※4 Segment
Supply voltage	V_{CC}	−	4.75	5	5.25	V	
Reference voltage	V_{ref}	−	2.00	2.1	2.21	V	
※6,7,8,9 Response frequency	f_{cm}	Common to high/low gain, -3dB	45	60	-	MHz	A
	$f_{cs}H$	Sub amp, Hign gain, -3dB	1	2	-	MHz	B
	$f_{cs}L$	Sub amp, Low gain, -3dB	16	24	-	MHz	B
※5,6,8,9 Peaking level	$V_{pk}2$	Common to high/low gain f=0.1 to 50MHz	-	-	3	dB	A
※9 Noise level	f_{nm}	Hign gain, 50 Ω end BW=30kHz, f=36MHz	-	-74	-70	dBm	A
Sensitivity 1	R_m1	Main amp, Hign gain	9	12	15	mV/μW	A
Sensitivity 2	R_m2	Main amp, Low gain	2.25	3	3.75	mV/μW	A
Sensitivity 3	R_m3	Sub amp, Hign gain	36	48	60	mV/μW	B
Sensitivity 4	R_m4	Sub amp, Low gain	9	12	15	mV/μW	B
Thermal drift of sensitivity	R_{sm}/T	Common to high/low gain	-	4 200	-	ppm/°C	A, B
Thermal drift of offset voltage	V_{od}/T	Common to high/low gain, No light	-	300	-	μV/°C	A, B
Thermal drift of offset voltage 1	$V_{os}1/T$	Main amp, Hign gain, No light	-	30	-	μV/°C	A
Thermal drift of offset voltage 2	$V_{os}2/T$	Main amp, Low gain, No light	-	25	-	μV/°C	A
Thermal drift of offset voltage 3	$V_{os}3/T$	Sub amp, Hign gain, No light	-	30	-	μV/°C	B
Thermal drift of offset voltage 4	$V_{os}4/T$	Sub amp, Low gain, No light	-	25	-	μV/°C	B
Thermal drift of offset voltage 5	$V_{os}5/T$	Between main-sub amp, Hign gain, No light	-	100	-	μV/°C	A-B
Thermal drift of offset voltage 6	$V_{os}6/T$	Between main-sub amp, Low gain, No light	-	75	-	μV/°C	A-B
Stabilization time at gain switching	$t_{str}2$	Common to high/low gain, time for ±3mV	-	-	25	μs	A, B
Settling time	t_{estm}	500mV → 10mV f=6.9MHz	-	30	-	ns	A
	t_{ests}	Low gain, fall time f=3.1MHz	-	90	-	ns	B
Maximum output voltage	$V_o$max	Common to high/low gain, V_{ref} reference	1	-	-	V	A, B

※3 Sampling rate is 1pc./reflection membrane formation process lot
※4 Appricable divisions correspond to output terminals.
A : V_A, V_B, V_C, V_D
B : V_{E+G}, V_{F+H}
※5 Difference from V_{ref}
※6 Light source is a laser diode of λ=780nm.
※7 -3dB level (0dB level is taken for output level when f=0.1MHz)
※8 10μW of DC light is applied to the center of each photodiode, and 4μW of AC light is irradiated. BW=10kHz
※9 5kΩ of resistor and 10pF of capacitor should be connected in parallel between output terminal and Vref terminal.

* 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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