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# GH5R41HA3C

(Under development)

## ■ Features

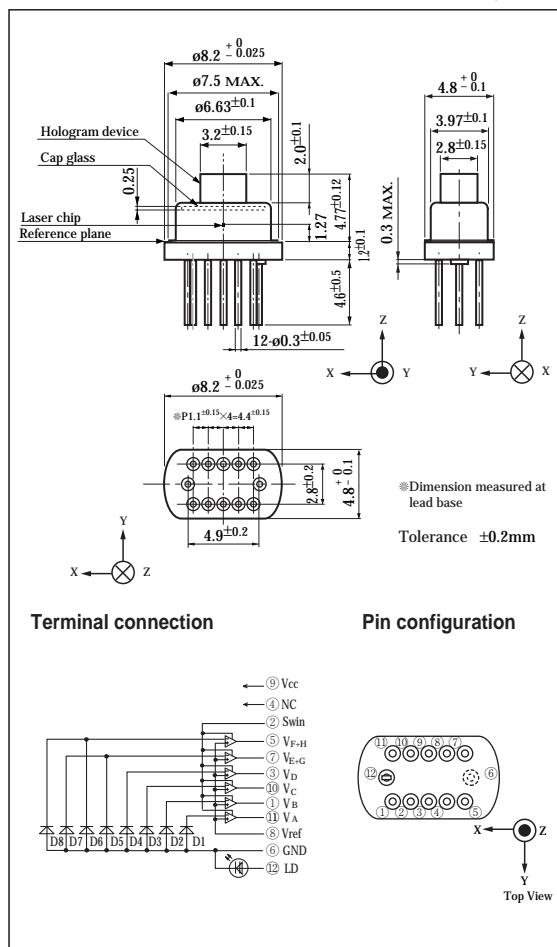
- (1) High power output (pulse MAX. 144mW)
  - (2) For MAX.  $\times 24$  speed CD-R,  $\times 40$  speed CD-ROM  
(With built-in MIN. 45MHz OPIC<sup>®</sup>)
  - (3) High coupling efficiency  
The ellipticity ( $\theta_{\perp}/\theta_{//}$ ) is close to 1.
  - (4)  $\phi 4.8$ mm thickness package
  - (5) With built-in beam splitter and diffraction grating
- <sup>®</sup>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

(T<sub>C</sub>=25°C)

Parameter	Symbol	Rating	Unit
① Optical power output	P <sub>HC</sub>	101	mW
② Optical power output (pulse)	P <sub>HP</sub>	144	mW
Reverse voltage	V <sub>R</sub>	2	V
OPIC supply voltage	V <sub>CC</sub>	6	V
Operating temperature	T <sub>opr</sub>	0 to +60	°C
Storage temperature	T <sub>stg</sub>	-40 to +85	°C
Soldering temperature	T <sub>sold</sub>	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)

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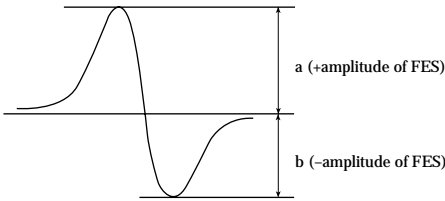
Electro-optical Characteristics

(Tc=25°C)

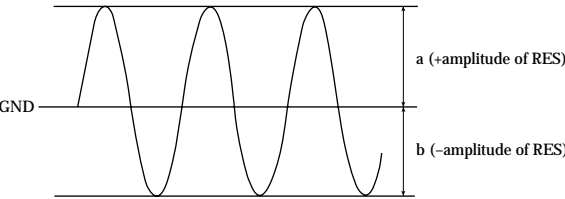
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
① Focal offset	DEF	Collimated lens output power 1.5mW, High gain	-0.7	-	+0.7	μm
② Focal error symmetry	BFES	Collimated lens output power 1.5mW, High gain	-25	-	+25	%
③ Radial error balance	BRES	Collimated lens output power 1.5mW, High gain	-25	-	+25	%
④ RF output amplitude	V <sub>RFH</sub>	Collimated lens output power 1.5mW, High gain	0.65	0.94	1.23	V
⑤ FES output amplitude	V <sub>FES</sub>	Collimated lens output power 1.5mW, High gain	0.35	0.59	0.94	V
⑥ RES output amplitude	V <sub>RES</sub>	Collimated lens output power 1.5mW, High gain	0.09	0.19	0.3	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 <sub>h</sub>	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<sub>A</sub>+V<sub>B</sub>+V<sub>C</sub>+V<sub>D</sub> (focal servo ON, radial servo ON)

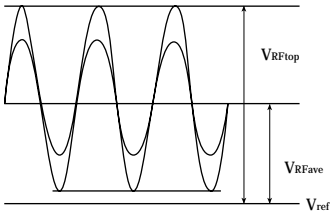
⑤ V<sub>B</sub>-V<sub>A</sub> (Focal vibration)

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<sub>C</sub>/V<sub>D</sub>

⑨ V<sub>RFtop</sub>/V<sub>RFave</sub>



Electro-optical Characteristics of Laser Diode

(Tc=25°C)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Threshold current		I <sub>th</sub>	—	-	30	41	mA
Operating current		I <sub>op</sub>	Po=100mW	-	130	155	mA
Operating voltage		V <sub>op</sub>	Po=100mW	-	2.2	2.5	V
Wavelength		λ <sub>p</sub>	Po=100mW	773	784	797	nm
Differential efficiency		η <sub>d</sub>	$\frac{70\text{mW}}{I(100\text{mW})-I(30\text{mW})}$	0.7	0.85	1.2	mW/mA
Stability of differential efficiency		Δη <sub>d</sub>	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	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<sup>※10</sup>

(Tc=25°C, Vcc=5V, Vref=2.1V)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit	※11 Segment
Supply current	ICC1	High gain, Gain switching SW=H	-	25	32	mA	
	ICC2	Low gain, Gain switching SW=L	-	30	35	mA	
※12 Output offset voltage	V <sub>od</sub>	Common to high/low gain, No light	-25	2	+25	mV	A, B
Offset voltage difference, Gain switching	ΔV <sub>od</sub>	Common to high/low gain	-30	-	+30	mV	A, B

※9 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)

※10 Applicable divisions correspond to output terminals .

A : V<sub>A</sub>, V<sub>B</sub>, V<sub>C</sub>, V<sub>D</sub>

B : V<sub>E+G</sub>, V<sub>F+H</sub>

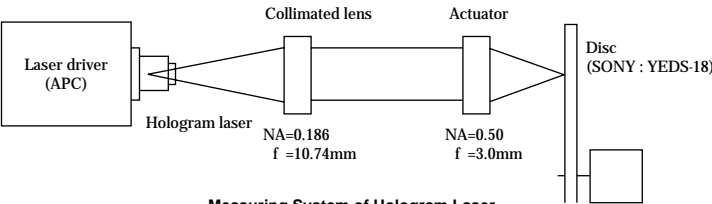
※11 Difference from V<sub>ref</sub>

Electro-optical Characteristics of Hologram Laser (Design Standard\*)<sup>※1</sup>

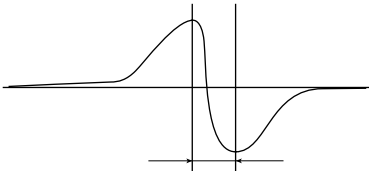
(Tc=25°C)

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

※1



※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<sub>C</sub>=25°C)

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

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

(T<sub>C</sub>=25°C)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Misalignment position	$\Delta x$	-	-	-80	-	+80	$\mu\text{m}$
	$\Delta y$			-80	-	+80	$\mu\text{m}$
	$\Delta z$			-80	-	+80	$\mu\text{m}$
③ Reflectivity of LD rear facet		R <sub>r</sub>	-	85	-	-	%

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

(T<sub>C</sub>=25°C, V<sub>CC</sub>=5V, V<sub>ref</sub>=2.1V)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit	④ Segment
Supply voltage	V <sub>CC</sub>	-	4.75	5	5.25	V	
Reference voltage	V <sub>ref</sub>	-	2.00	2.1	2.21	V	
Output terminal current	I <sub>o</sub>	Common to high/low gain	-0.03	0.01	0.3	mA	A, B
Reference voltage terminal current	I <sub>ref</sub>	Common to high/low gain, No light	-0.5	1	2	mA	
⑥, ⑧ Response frequency	f <sub>cm</sub>	Main amp, Common to high/low gain, -3dB	45	60	-	MHz	A
	f <sub>cs</sub>	Sub amp, Common to high/low gain, -3dB	1	2	-	MHz	B
⑤, ⑧ Peaking level	V <sub>pk2</sub>	Common to high/low gain f=0.1 to 50MHz	-	-	3	dB	A
⑨ Noise level	f <sub>nm</sub>	Hign gain, 50 $\Omega$ end BW=30kHz, f=36MHz	-	-74	-68	dBm	A
Sensitivity 1	R <sub>m1</sub>	Main amp, Hign gain	18	24	30	mV/ $\mu\text{W}$	A
Sensitivity 2	R <sub>m2</sub>	Main amp, Low gain	0.72	0.96	1.2	mV/ $\mu\text{W}$	A
Sensitivity 3	R <sub>m3</sub>	Sub amp, Hign gain	72	96	120	mV/ $\mu\text{W}$	B
Sensitivity 4	R <sub>m4</sub>	Sub amp, Low gain	2.88	3.84	4.8	mV/ $\mu\text{W}$	B
Thermal drift of sensitivity	R <sub>sm</sub> /T	Common to high/low gain	-	4 200	-	ppm/°C	A, B
Thermal drift of offset voltage	V <sub>od</sub> /T	Common to high/low gain, No light	-	300	-	$\mu\text{V}/^{\circ}\text{C}$	A, B
Thermal drift of offset voltage 1	V <sub>os1</sub> /T	Main amp, Hign gain, No light	-	30	-	$\mu\text{V}/^{\circ}\text{C}$	A
Thermal drift of offset voltage 2	V <sub>os2</sub> /T	Main amp, Low gain, No light	-	15	-	$\mu\text{V}/^{\circ}\text{C}$	A
Thermal drift of offset voltage 3	V <sub>os3</sub> /T	Sub amp, Hign gain, No light	-	30	-	$\mu\text{V}/^{\circ}\text{C}$	B
Thermal drift of offset voltage 4	V <sub>os4</sub> /T	Sub amp, Low gain, No light	-	15	-	$\mu\text{V}/^{\circ}\text{C}$	B
Thermal drift of offset voltage 5	V <sub>os5</sub> /T	Between main-sub amp, Hign gain, No light	-	100	-	$\mu\text{V}/^{\circ}\text{C}$	A-B
Thermal drift of offset voltage 6	V <sub>os6</sub> /T	Between main-sub amp, Low gain, No light	-	45	-	$\mu\text{V}/^{\circ}\text{C}$	A-B
Over/undershoot at gain switching	t <sub>sr1</sub>	Common to high/low gain, Integral value of the first overshoot/undershoot peak value and overshoot/undershoot time	-	200	-	$\mu\text{s} \times \text{mV}$	A, B
Stabilization time at gain switching	t <sub>sr2</sub>	Common to high/low gain, time for $\pm 3\text{mV}$	-	-	25	$\mu\text{s}$	A, B
Settling time	t <sub>est</sub>	Output voltage 500mV $\rightarrow$ 5mV	f=6.9MHz	30	-	ns	A
		Low gain, fall time					
Maximum output voltage	V <sub>omax</sub>	Common to high/low gain, V <sub>ref</sub> reference	1	-	-	V	A, B

③ Sampling rate is 1pc./reflection membrane formation process lot

④ Applicable divisions correspond to output terminals.

A : V<sub>A</sub>, V<sub>B</sub>, V<sub>C</sub>, V<sub>D</sub>B : V<sub>E</sub>+G, V<sub>F</sub>+H⑤ Difference from V<sub>ref</sub>⑥ Light source is a laser diode of  $\lambda=780\text{nm}$ .

⑦ -3dB level (0dB level is taken for output level when f=0.1MHz)

⑧ 10 $\mu\text{W}$  of DC light is applied to the center of each photodiode, and 4 $\mu\text{W}$  of AC light is irradiated. BW=10kHz⑨ 5k $\Omega$  of resistor and 10pF of capacitor should be connected in parallel between output terminal and V<sub>ref</sub> 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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