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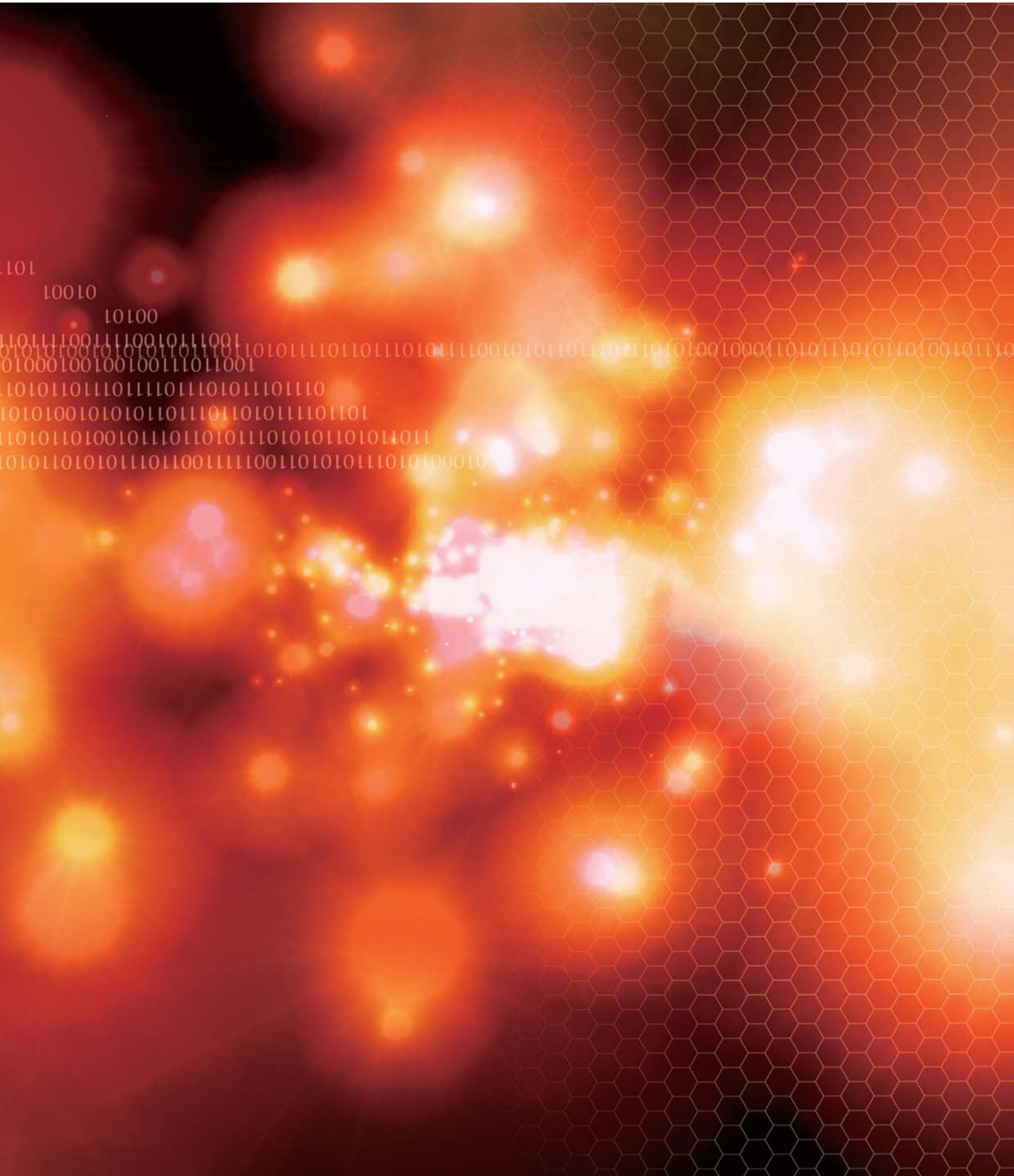
2009

Laser / Hologram Unit for Optical Disk



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⚠DANGER

■ This product contains Gallium Arsenide (GaAs).

GaAs powder and vapor are hazardous to human health if inhaled or ingested. Do not burn, destroy, cut, cleave off, or chemically dissolve the product. Follow related laws and ordinances for disposal. The product should be excluded from general industrial waste or household garbage.

■ Do not touch or look into the laser beam directly.

The laser beam may cause injury to the eye or skin, or loss of eyesight.

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Even when the products are used within the guaranteed values, take into the consideration of incidence of break down and failure mode, possible to occur to semiconductor products. Measures on the systems such as redundant design, arresting the spread of fire or preventing glitch are recommended in order to prevent physical injury, fire, social damages, for example, by using the products.

(6) Comply with the instructions for use in order to prevent breakdown and characteristics change due to external factors (ESD, EOS, thermal stress and mechanical stress) at the time of handling, mounting or at customer's process. When using products for which damp-proof packing is required, satisfy the conditions, such as shelf life and the elapsed time since first opening the packages.

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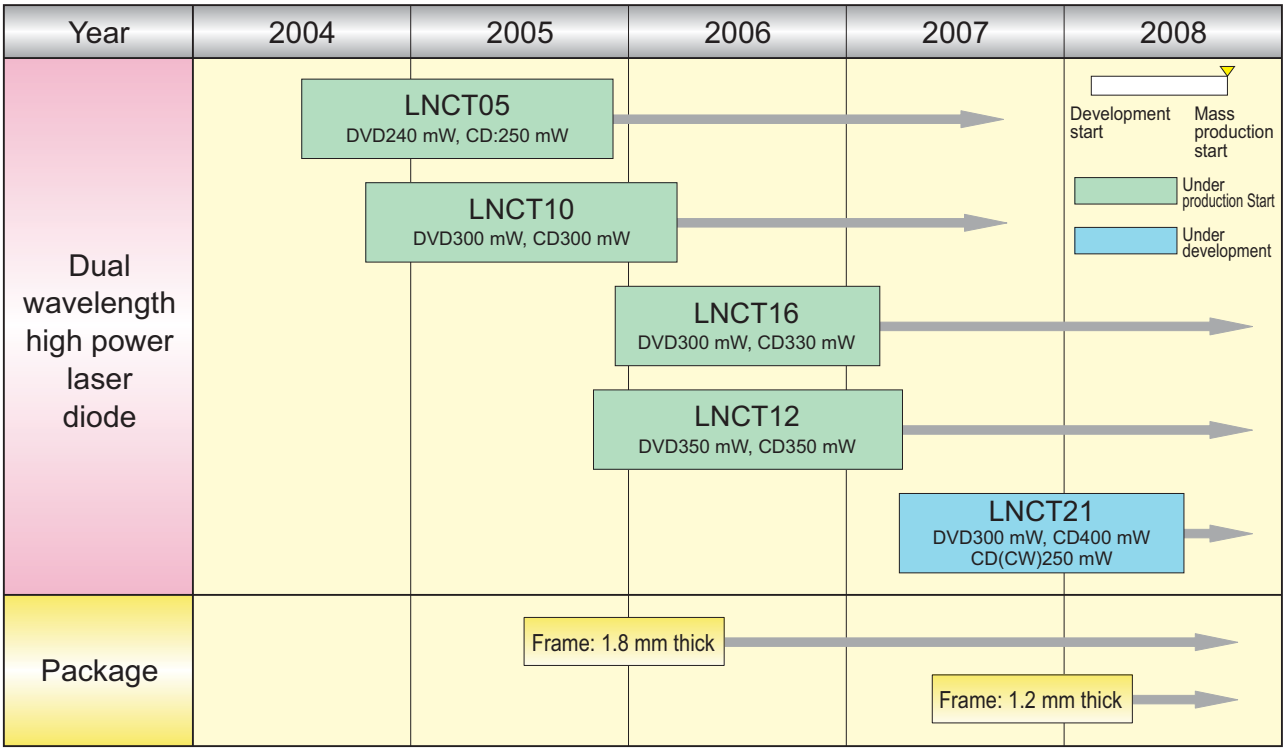
If you have any inquiries or questions about this book or our semiconductor products, please contact one of our sales offices listed on the back or our sales division.

Roadmap



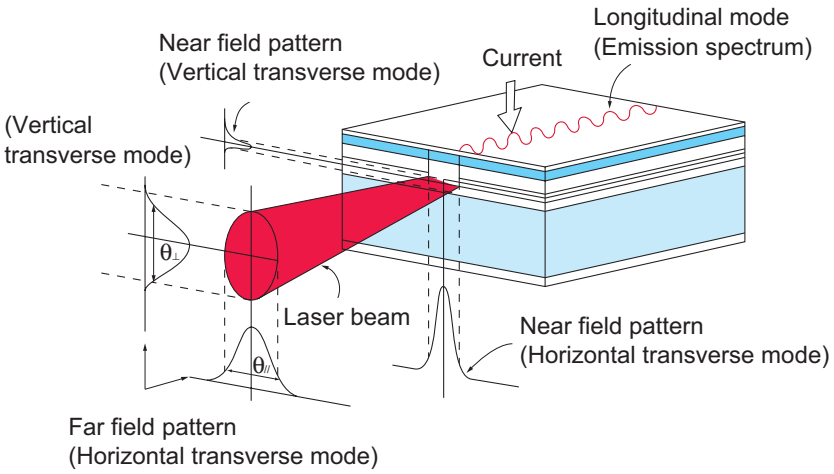
Specification List

Application	Part No.		Features	Electro/Optical Characteristics (Standard Values; T_C = 25°C)							Package No.	Page
				P_O max (mW)	I_{th}(mA)	I_{op}(mA)	V_{op}(V)	λ(nm)	Differential efficiency (W/A)	Coherent length (mm)		
Dual wavelength high power for DVD/CD write/read	LNCT12PF	DVD	Pulsed light output 350 mW 40 ns, 33%	350	55	CW, P_O = 100 mW 150	2.4	661	1.05	6.99	Frame PKG15	12
		CD	Pulsed light output 380 mW 85 ns, 50%	350	55	CW, P_O = 150 mW 215	2.4	785	0.95	6.22		
	LNCT16PF	DVD	Pulsed light output 300 mW 30 ns, 35%	300	50	CW, P_O = 90 mW 130	2.45	661	1.1	6.25	Frame PKG15	13
		CD	Pulsed light output 330 mW 100 ns, 50%	330	55	CW, P_O = 160 mW 215	2.45	785	1.0	5.55		
	LNCT21PU	DVD	Pulsed light output 300 mW 30 ns, 35%	300	50	CW, P_O = 90 mW 130	2.45	661	1.1	6.25	Frame PKG17	14 15
		CD	Pulsed light output 400 mW 100 ns, 50%	400	55	CW, P_O = 160 mW 215	2.45	785	1.0	5.57		

Application	Part No.		Features	Electro/Optical Characteristics (Standard Values; T_C = 25°C)							Package No.	Page
				P_O max (mW)	I_{th}(mA)	I_{op}(mA)	V_{op}(V)	λ(nm)	θ_h(deg)	θ_V(deg)		
Blu-ray write	LNC415FG	BD	Blue-violet pulsed light output 320 mW	320 (30 ns, 50%)	38	CW, P_O = 80 mW 90	5.2	405	8	18	3.8CAN PKG	16

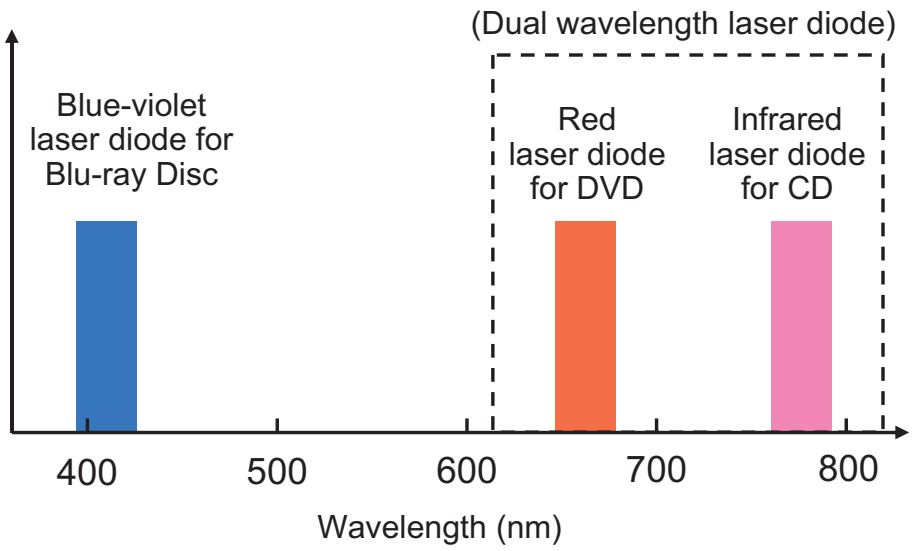
On the semiconductor laser diode

The laser diode (LD) has the laser active area between P type semiconductor layer and N type semiconductor layer, injects electrons and electron holes into the active area for radiative recombination, and then amplifies and reflects the radiated light with a cleavage mirror formed on the chip end face for resonance to emit a single-colored, highly directional, coherent laser beam. An optical lens enables to focus a laser beam spot near the diffraction limit.
The laser diode is widely used as the light source for reading and writing of various optical disks.



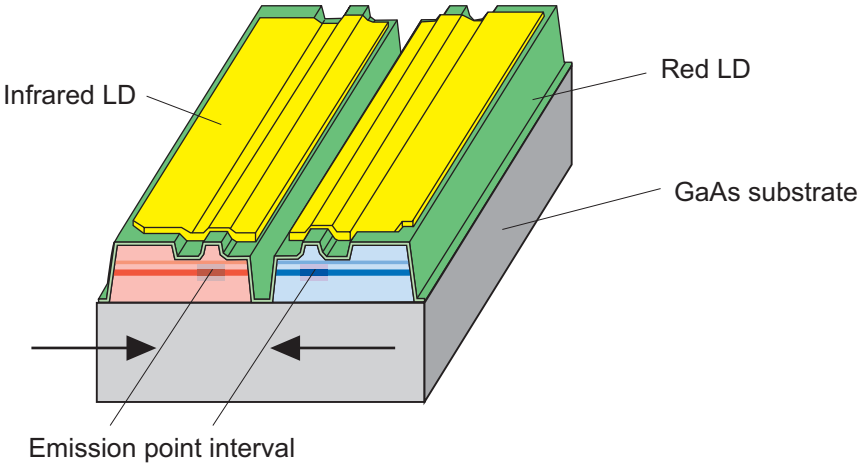
Laser diodes of different wavelengths

Laser diodes of different wavelengths are used in accordance with the type of optical disk.
Blue-violet laser diode (Wavelength: 405 nm) is used for Blu-ray Disc, red laser diode (Wavelength: 661 nm) is used for DVD, and infrared laser diode (Wavelength: 785 nm) is used for CD optical disc.



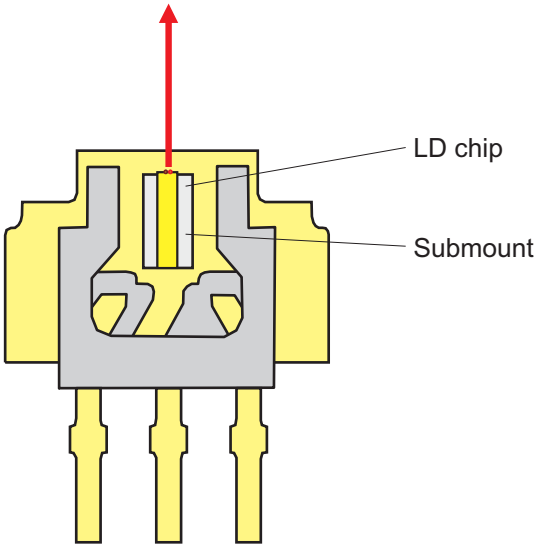
Dual wavelength laser diode structure

The figure below shows the structure of a dual wavelength laser diode chip.
A red laser diode and infrared laser diode are integrated monolithically onto a GaAs substrate.
Emission points are formed simultaneously for the red laser diode and the infrared laser diode, to realize the interval (110 µm) of emission points with high accuracy.
The dual wavelength laser diode operates very reliably even at high temperature and high output, due to its low loss optical waveguide structure and the window structure formed on the chip facet.



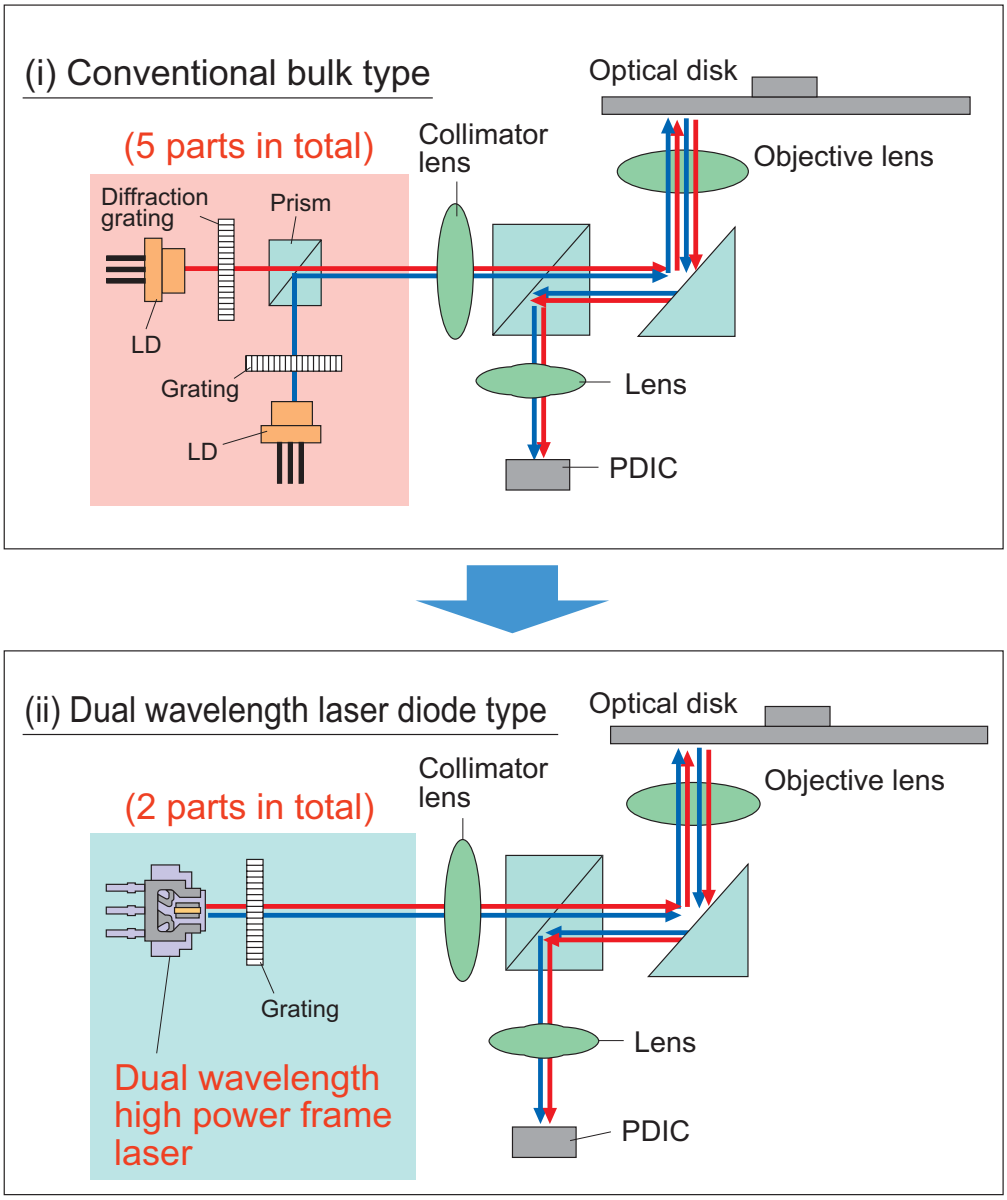
Assembly appearance (Frame package)

The figure below shows the appearance of a dual wavelength high power laser frame package.
A dual wavelength high power laser diode chip is mounted on a small, thin frame package using a submount.
This compact structure can be used as the light source for any type of optical disk drives from the ultra-thin type to the half-height type.

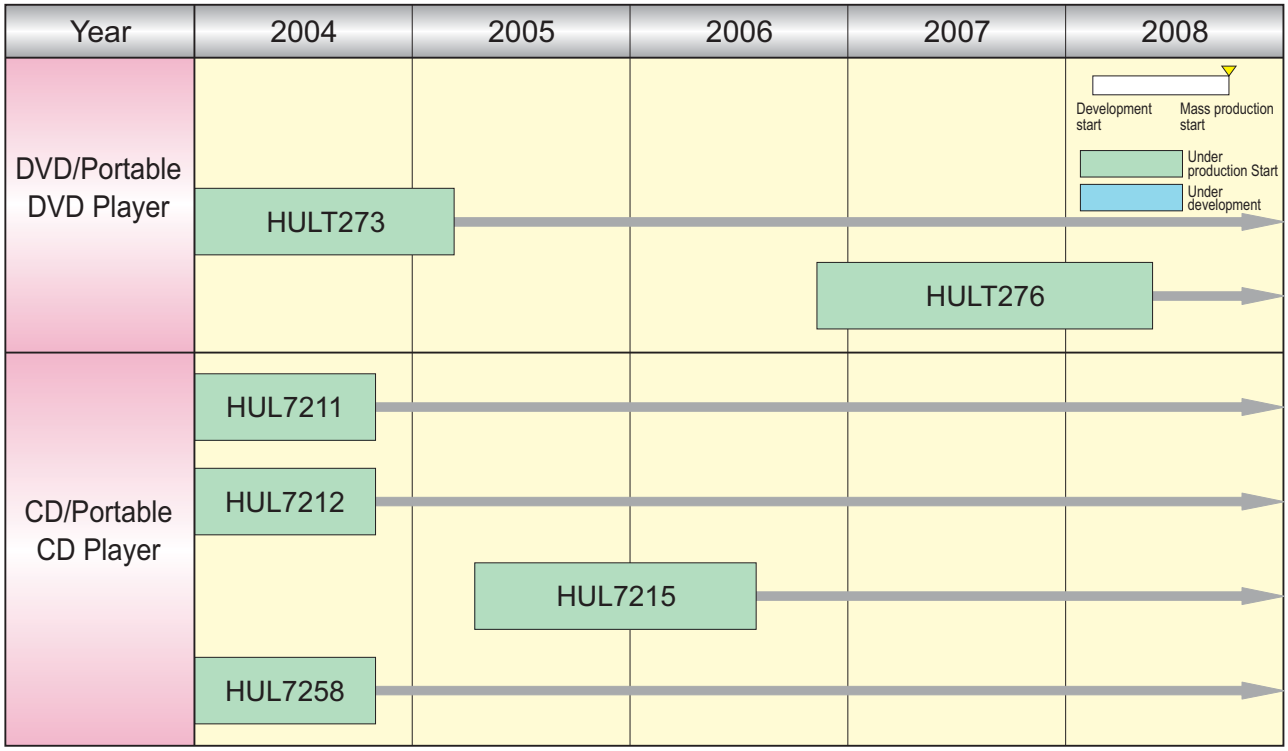


Optical pickup system simplified

The figures below offer comparison of the optical pickup for writing DVD and CD between (i) conventional bulk type structure in which two CAN laser diodes are used and (ii) dual wavelength laser diode type structure in which one dual wavelength laser frame package is used.
Adoption of a dual wavelength laser frame package reduces the number of components and the number of optical axes to be adjusted, and achieves a small, simple optical pickup configuration that is easy to assemble.
In the BD/DVD/CD optical pickup for leading-edge Blu-ray Discs, the dual wavelength laser structure is indispensable in order to avoid complicated optical configurations.



Roadmap



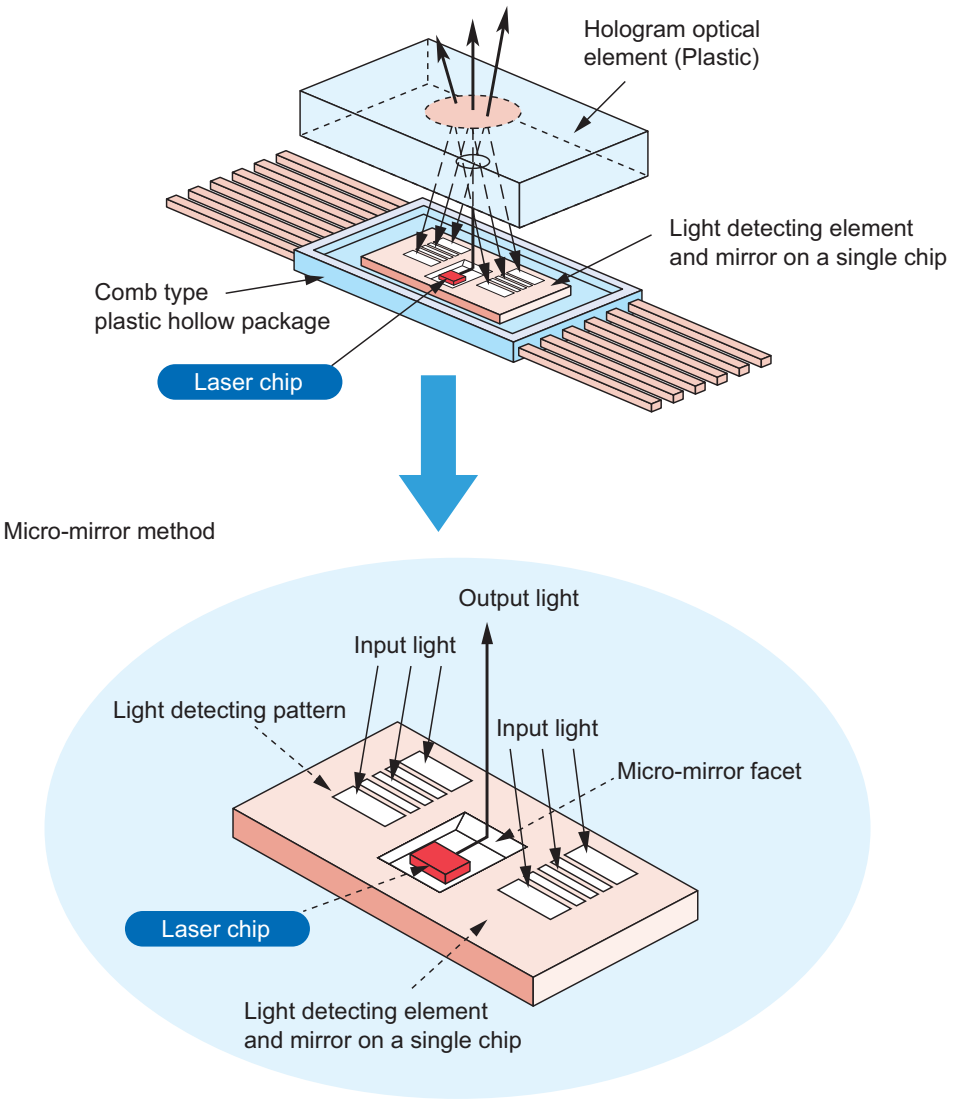
Specification List

Application	Part No.	Features	Error Signal Detection Method		V_{CC} (V)	P_O max (mW)	λ (nm)	Package No.	Page
			Focus error	Tracking error					
DVD/Portable DVD Player	HULT273	・Dual wavelength laser diode (1 chip) is mounted. ・For reading DVD / CD ・CD and CD-R: Reading at 24x speed DVD and DVD-R: Reading at 8x speed DVD-RAM: Reading at 5x speed	SSD method	(CD, CD-R) 3-beam method (DVD, DVD-R) Phase differential method (DVD-RAM) 3-beam Push pull method	5	DVD:6 CD:8	DVD:667 CD:785	PKG07	18 ・ 19
	HULT276	・Multi-mode dual wavelength laser diode (1 chip) eliminates the necessity of superimposing at high frequency. ・For reading DVD / CD ・CD and CD-R: Reading at 24x speed DVD and DVD-R: Reading at 8x speed DVD-RAM: Reading at 5x speed				DVD:5 CD:6			20 ・ 21
CD/Portable CD Player	HUL7211	・Low voltage drive (V_{CC} = 3 V) ・Low power consumption laser diode ・Built-in I-V conversion amp.	SSD method	3-beam method	3	3.6	795	PKG01	22
	HUL7212	・Low power consumption laser diode ・Built-in I-V conversion amp.			5		800		23
	HUL7215	・Low voltage drive (V_{CC} = 3 V) ・Low power consumption laser diode ・Built-in I-V conversion amp.			3		795	PKG01-6	24
	HUL7258	・Low voltage drive (V_{CC} = 3 V) ・Built-in I-V conversion amp. ・Low power consumption laser diode ・Ultra thin package is adopted						PKG03	25

On the Hologram Unit

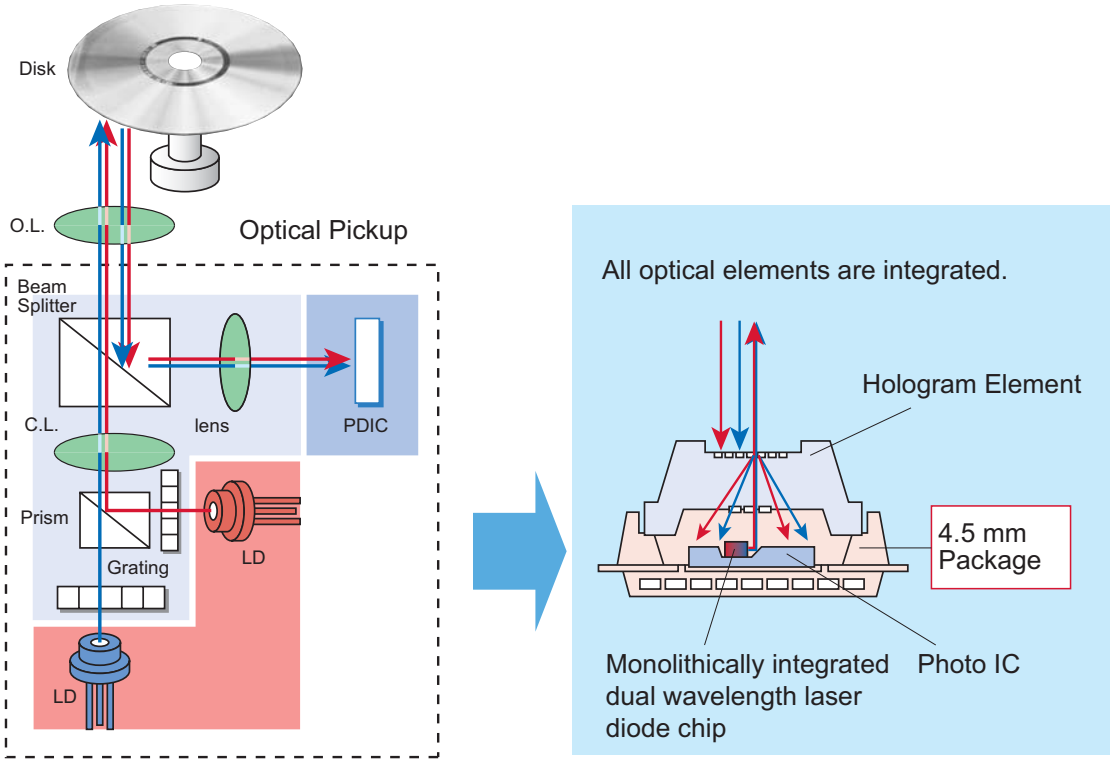
Hologram Unit, as it's revealing on its name, sophisticated optical diffractive hologram design enables to integrate the plural optical pickup functions into a compact package. Laser diode, signal detecting photo-diode IC, diffractive grating and beam splitter functions are built in compact plastic package to form fundamental optical pickup configuration.
The optical pickup is simply realized by focusing the output light from Hologram Unit to the optical disc by the optical objective lens.
Hologram Unit not only realizes the small and thin optical pickup size, but also simplify the assembly process, and helps to improve the mechanical reliability regarding vibration resistance.
Built-in high speed photo-diode ICs are designed for CD and DVD/CD applications to realize the highest performances, respectively.

Hologram Unit Configuration



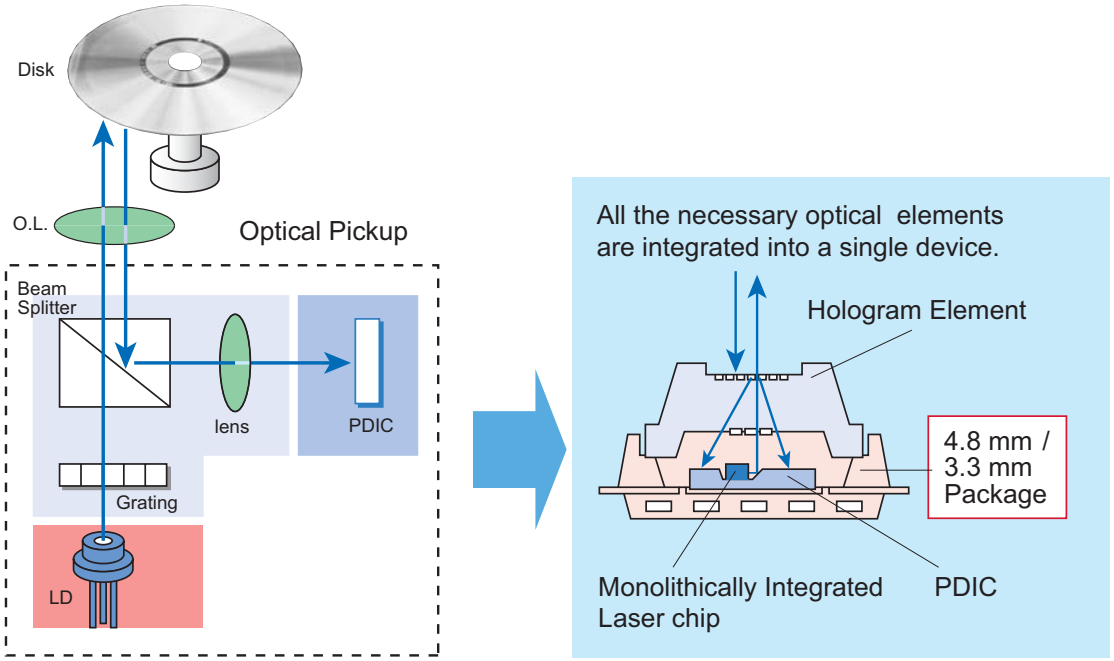
Configuration of DVD Pickup

All of the eight devices consisting the optical pickup are integrated into a single unit.

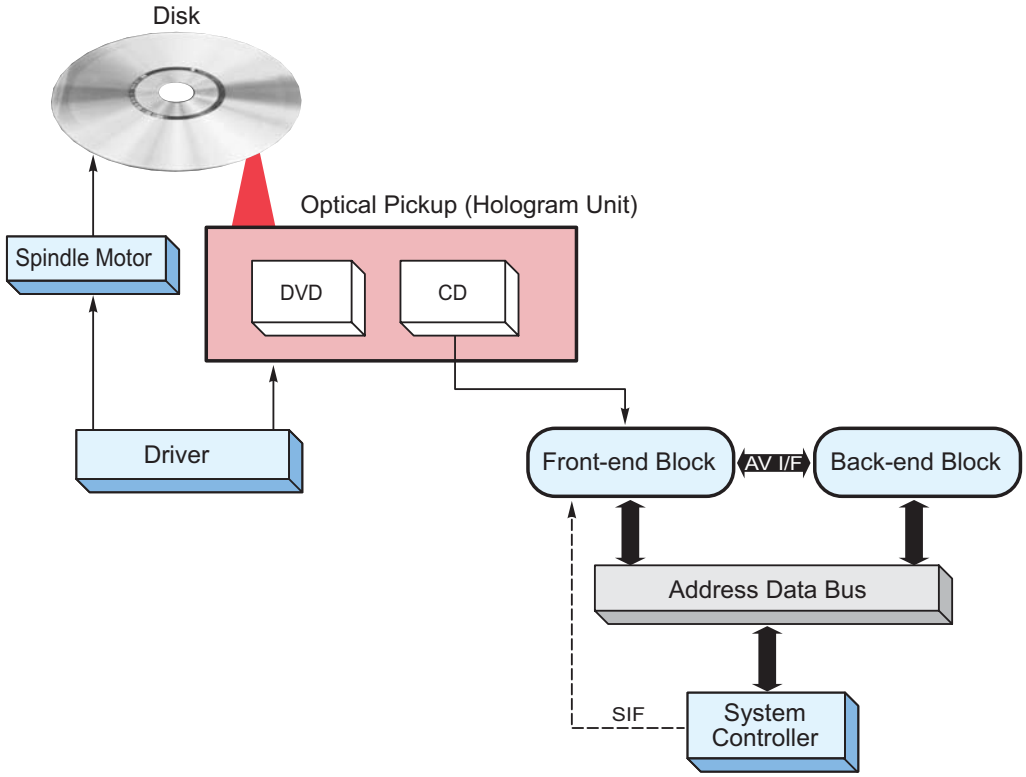


Configuration of CD Pickup

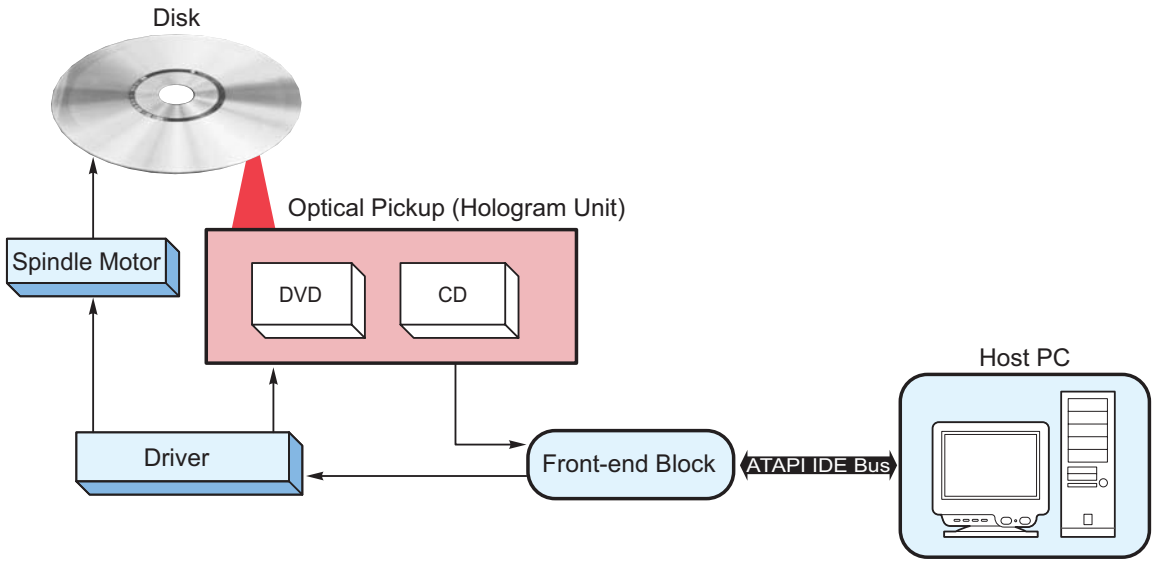
All of the five devices consisting the optical pickup are integrated into a single unit.



Block Diagram: DVD Player



Block Diagram: DVD-ROM Drive



Laser Diode

LNCT12PF

Red/Infrared Dual Wavelength Laser Diode

(Record and reproduction for DVD/CD)

Features

- High output characteristics in a small package optimum for DVD recording OPU
- Pulsed light output: Red: 350 mW, Infrared: 350 mW
- Small frame package 1.8 mm thick

Package No.

- Frame PKG15

Absolute Maximum Ratings

Parameter		Symbol	DVD Ratings	CD Ratings	Unit
Output power	CW	P_O	100	150	mW
	Pulse		350 (Pulse width: 40 ns; Duty: 33%)	350 (Pulse width: 85 ns; Duty: 50%)	mW
Reverse voltage		V_r	1.5	1.5	V
Operating temperature		T_C (CW)	−10 to +75	−10 to +75	°C
		T_C (Pulse)	−10 to +75	−10 to +75	°C
Storage temperature		T_{stg}	−40 to +85	−40 to +85	°C

Electro-Optical Characteristics $T_C = 25°C$

Parameter		Symbol	Conditions *1	DVD			CD			Unit
				Min	Typ	Max	Min	Typ	Max	
Threshold current		I_{th}	CW	—	55	80	—	55	80	mA
Operating current		I_{op}	CW, P_O = 100 mW(DVD) P_O = 150 mW(CD)	—	150	200		215	260	mA
Operating voltage		V_{op}		—	2.4	3.0		2.4	3.0	V
Oscillation wavelength		λ		656	661	664	779	785	791	nm
Radiation angle	Horizontal	θ_h	CW, P_O = 5, 100 mW(DVD) P_O = 5, 150 mW(CD)	8	—	12	6.5	—	10.5	deg
	Vertical	θ_v		14	—	19.5	13	—	17.5	deg
Radiation angle power fluctuation	Horizontal	$\Delta\theta_h$		−2	—	+2	−1.0	—	+3.0	deg
	Vertical	$\Delta\theta_v$		−2	—	+2	−1.0	—	+3.0	deg
Optical axis tilting	Horizontal	θ_x		−2	—	+2	−2	—	+2	deg
	Vertical	θ_y		−2	—	+2	−2	—	+2	deg
Optical axis tilting power fluctuation	Horizontal	$\Delta\theta_x$		−2	—	+2	−2	—	+2	deg
	Vertical	$\Delta\theta_y$		−2	—	+2	−2	—	+2	deg
Relative optical axis tilting	Horizontal	$\Delta\theta_{//}$	CW, P_O = 5 mW				−2	—	+2	deg
	Vertical	$\Delta\theta_{\perp}$	CW, P_O = 5 mW				−2	—	+2	deg
Differential efficiency		η	CW, P_O = 5 – 100 mW(DVD) P_O = 5 – 150 mW(CD)	0.85	1.05	—	0.75	0.95	—	W/A
Series resistance		R_s		—	3.5	6.0	—	3.4	6	Ω
Polarization ratio		TE/TM	CW, P_O = 5 mW	15	—	—	15	—	—	—
Coherent length		nL	—	6.91	6.99	7.07	6.14	6.22	6.29	mm

*1: Case temperature T_C = 25°C, DVD laser pulse condition: Pulse width = 40 ns, duty = 33%, CD laser pulse condition: Pulse width = 85 ns, duty = 50% unless otherwise specified

LNCT16PF

Red/Infrared Dual Wavelength Laser Diode

(Record and reproduction for DVD/CD)

Features

- High output characteristics in a small package optimum for DVD recording OPU
- Pulsed light output: Red: 300 mW, Infrared: 330 mW
- Small frame package 1.8 mm thick

Package No.

- Frame PKG15

Absolute Maximum Ratings

Parameter		Symbol	DVD Ratings	CD Ratings	Unit
Output Power	CW	P_O	90	160	mW
	Pulse		300 (Pulse width: 30 ns; Duty: 35%)	330 (Pulse width: 100 ns; Duty: 50%)	mW
Reverse voltage		V_r	1.5	1.5	V
Operating temperature		T_C (CW)	−10 to +80	−10 to +80	°C
		T_C (Pulse)	−10 to +80	−10 to +80	°C
Storage temperature		T_{stg}	−40 to +85	−40 to +85	°C

Electro-Optical Characteristics $T_C = 25°C$

Parameter		Symbol	Conditions *1	DVD			CD			Unit
				Min	Typ	Max	Min	Typ	Max	
Threshold current		I_{th}	CW	30	50	80	30	55	80	mA
Operating current		I_{op}	CW, P_O = 90 mW(DVD) P_O = 160 mW(CD)	115	130	170	170	215	250	mA
Operating voltage		V_{op}		2.0	2.45	3.0	2.0	2.45	3.0	V
Oscillation wavelength		λ		656	661	665	777	785	790	nm
Radiation angle	Horizontal	θ_h	CW, P_O = 5, 90 mW(DVD) P_O = 5, 160 mW(CD)	8	—	12	6.5	—	11.5	deg
	Vertical	θ_v		13	—	19.5	12	—	18	deg
Radiation angle power fluctuation	Horizontal	$\Delta\theta_h$		–2	—	+2	0	—	+3.0	deg
	Vertical	$\Delta\theta_v$		–2	—	+2	–1.5	—	+2.5	deg
Optical axis tilting	Horizontal	θ_x		–2	—	+2	–2	—	+2	deg
	Vertical	θ_y		–2	—	+2	–2	—	+2	deg
Optical axis tilting power fluctuation	Horizontal	$\Delta\theta_x$		–1.5	—	+1.5	–1.5	—	+1.5	deg
	Vertical	$\Delta\theta_y$		–1.5	—	+1.5	–1.5	—	+1.5	deg
Relative optical axis tilting	Horizontal	$\Delta\theta_{//}$	CW, P_O = 5 mW				–2	—	+2	deg
	Vertical	$\Delta\theta_{\perp}$	CW, P_O = 5 mW				–2	—	+2	deg
Differential efficiency		η	CW, P_O = 5 – 90 mW(DVD) P_O = 5 – 160 mW(CD)	0.85	1.1	1.25	0.80	1.0	1.15	W/A
Series resistance		R_s		—	4.0	5.3	—	4.0	5.3	Ω
Polarization ratio		TE/TM	CW, P_O = 5 mW	12	—	—	12	—	—	—
Coherent length		nL	—	6.20	6.25	6.29	5.51	5.55	5.59	mm

*1: Case temperature T_C = 25°C, DVD laser pulse condition: Pulse width = 30 ns, duty = 35%, CD laser pulse condition: Pulse width = 100 ns, duty = 50% unless otherwise specified

LNCT21PU

Red/Infrared Dual Wavelength Laser Diode

(Record and reproduction for DVD/CD)

Features

- Infrared light output: 250 mW (during CW operation) suitable to light scribing
- Pulsed light output: Red: 300 mW, Infrared: 400 mW
- Extremely thin frame package 1.2 mm thick

Package No.

- Frame PKG17

Absolute Maximum Ratings(DVD)

Parameter		Symbol	Ratings	Unit
Output Power	CW	P_O	90	mW
	Pulse		300 (Pulse width: 30 ns; Duty: 35%)	mW
Reverse voltage		V_r	1.5	V
Operating temperature		T_C (CW)	−10 to +85	°C
		T_C (Pulse)	−10 to +85	°C
Storage temperature		T_{stg}	−40 to +90	°C

Electro-Optical Characteristics(DVD) $T_C = 25°C$

Parameter		Symbol	Conditions *1	Min	Typ	Max	Unit
Threshold current		I_{th}	CW	30	50	80	mA
Operating current		I_{op}	CW, P_O = 90 mW	115	130	170	mA
Operating voltage		V_{op}		2.0	2.45	3.0	V
Oscillation wavelength		λ		656	661	665	nm
Radiation angle	Horizontal	θ_h	CW, P_O = 5, 90 mW	8	−	12	deg
	Vertical	θ_v		13	−	19.5	deg
Radiation angle power fluctuation	Horizontal	$\Delta\theta_h$		−2	−	+2	deg
	Vertical	$\Delta\theta_v$		−2	−	+2	deg
Optical axis tilting	Horizontal	θ_x		−2	−	+2	deg
	Vertical	θ_y		−2	−	+2	deg
Optical axis tilting power fluctuation	Horizontal	$\Delta\theta_x$		−1.5	−	+1.5	deg
	Vertical	$\Delta\theta_y$		−1.5	−	+1.5	deg
Relative optical axis tilting	Horizontal	$\Delta\theta_{//}$	CW, P_O = 5 mW				deg
	Vertical	$\Delta\theta_{\perp}$	CW, P_O = 5 mW				deg
Differential efficiency		η	CW, P_O = 5 − 90 mW	0.85	1.1	1.25	W/A
Series resistance		R_s		−	4.0	5.3	Ω
Polarization ratio		TE/TM	CW, P_O = 5 mW	12	−	−	—
Coherent length		nL	—	6.20	6.25	6.29	mm

*1: Case temperature T_C = 25°C, DVD laser pulse condition: Pulse width = 30 ns, duty = 35%, CD laser pulse condition: Pulse width = 100 ns, duty = 50% unless otherwise specified

Absolute Maximum Ratings(CD)

Parameter		Symbol	Ratings	Unit
Output Power	CW	P_O	250	mW
	Pulse		400 (Pulse width: 100 ns; Duty: 50%)	mW
Reverse voltage		V_r	1.5	V
Operating temperature		T_C (CW)	−10 to +90	°C
		T_C (Pulse)	−10 to +90	°C
Storage temperature		T_{stg}	−40 to +90	°C

Electro-Optical Characteristics(CD) $T_C = 25°C$

Parameter		Symbol	Conditions *2	Min	Typ	Max	Unit
Threshold current		I_{th}	CW	30	55	80	mA
Operating current		I_{op}	CW, P_O = 160 mW	170	215	250	mA
Operating voltage		V_{op}		2.0	2.45	3.0	V
Oscillation wavelength		λ		777	785	790	nm
Radiation angle	Horizontal	θ_h	CW, P_O = 5, 160 mW	6.5	—	11.5	deg
	Vertical	θ_v		12	—	18	deg
Radiation angle power fluctuation	Horizontal	$\Delta\theta_h$		0	—	+3.0	deg
	Vertical	$\Delta\theta_v$		−1.5	—	+2.5	deg
Optical axis tilting	Horizontal	θ_x		−2	—	+2	deg
	Vertical	θ_y		−2	—	+2	deg
Optical axis tilting power fluctuation	Horizontal	$\Delta\theta_x$		−1.5	—	+1.5	deg
	Vertical	$\Delta\theta_y$		−1.5	—	+1.5	deg
Relative optical axis tilting	Horizontal	$\Delta\theta_{//}$	CW, P_O = 5 mW	−2	—	+2	deg
	Vertical	$\Delta\theta_{\perp}$	CW, P_O = 5 mW	−2	—	+2	deg
Differential efficiency		η	CW, P_O = 5 – 160 mW	0.80	1.0	1.15	W/A
Series resistance		R_s		—	4.0	5.3	Ω
Polarization ratio		TE/TM	CW, P_O = 5 mW	12	—	—	—
Coherent length		nL	—	5.53	5.57	5.61	mm

*2: Case temperature T_C = 25°C, DVD laser pulse condition: Pulse width = 30 ns, duty = 35%,
CD laser pulse condition: Pulse width = 100 ns, duty = 50% unless otherwise specified

Under development

LNC415FG

Blue-violet Ultra High Power Laser Diode

(Record for Blu-ray Disc)

Features

- Ultra high power:
  Pulsed light output of 320 mW
- Oscillation wavelength of 405 nm optimum for recording in Blu-ray Disc
- Slim CAN package of 3.8 mm in diameter

Package No.

- 3.8CAN PKG

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Ratings	Unit
Output power	$P_{cw, max}$	CW	80	mW
	$P_{pulse, max}$	Pulse (30 ns; Duty: 50%)	320	mW
Operating temperature	$T_{op, max}$	Case temperature	75	°C

Electro-Optical Characteristics $T_C = 25°C$

Parameter		Symbol	Conditions *1	Min	Typ	Max	Unit
Threshold current		I_{th}	CW	—	38	—	mA
Operating current		I_{op}	CW, $P_o = 80$ mW	—	90	—	mA
Operating voltage		V_{op}	CW, $P_o = 80$ mW	—	5.2	—	V
Oscillation wavelength		λ	CW, $P_o = 80$ mW	—	405	—	nm
Radiation angle	Horizontal	θ_h	CW, $P_o = 80$ mW	—	8	—	deg
	Vertical	θ_v	CW, $P_o = 80$ mW	—	18	—	deg

*1 Unless otherwise noted, case temperature $T_C = 25°C$. Pulse condition is pulse width = 30 ns, duty = 50%.

Hologram Unit

HULT273

For DVD Player/Portable DVD Player

Features

- Dual wavelength laser diode (1 chip) is mounted.
- For reading of DVD and CD
- CD and CD-R: Reading at 24 × speed
  DVD and DVD-R: Reading at 8 × speed
  DVD-RAM: Reading at 5 × speed

Error Signal Detection Method

- Focus error signal detection: SSD method
- Tracking error signal detection:
  CD, CD-R: 3-beam method
  DVD, DVD-R: Phase differential method
  DVD-RAM: 3-beam Push pull method

Package No.

- PKG07

Absolute Maximum Ratings

Parameter		Symbol	Ratings	Unit
Output power	DVD	$P_{O(HOE\ OUT)}$	6	mW
	CD	$P_{O(HOE\ OUT)}$	8	
Reverse voltage		$V_{R(LD)}$	1.5	V
Supply voltage		V_{CC}	6	V
Reference voltage		V_{ref}	+2.1 to +2.3	V
Operating package temperature		T_C	−10 to +75	°C
Storage temperature		T_{stg}	−40 to +85	°C

Unit Characteristic Specifications (DVD) $T_C = 25°C \pm 3°C$

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Threshold current	I_{th}	CW	5	15	30	mA
Operating current	I_{OP}	CW, V_{RF} = 820 mV, V_{CC} = 5 V	10	20	35	mA
Operating voltage	V_{OP}		—	2.1	3.0	V
Oscillation wavelength	λ	CW, $P_{O(HOE\ OUT)}$ = 5 mW	659	667	675	nm
Optical output from lens	P_O	CW, V_{RF} = 820 mV, V_{CC} = 5 V	—	0.2	0.5	mW
Focus error signal amplitude	V_{FE}		400	650	900	mV
Focus error signal balance	B_{FE}		−20	—	+20	%
Radial optical flux balance	RAB		−25	0	+25	%
Tangential optical flux balance	TAB		−25	0	+25	%
Jitter	Jitter		—	—	10	%

Unit Characteristic Specifications (CD) $T_C = 25°C \pm 3°C$

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Threshold current	I_{th}	CW	5	15	30	mA
Operating current	I_{OP}	CW, V_{RF} = 600 mV, V_{CC} = 5 V	10	20	35	mA
Operating voltage	V_{OP}		—	2.0	3.0	V
Oscillation wavelength	λ	CW, $P_{O(HOE\ OUT)}$ = 7 mW	775	785	805	nm
Optical output from lens	P_O	CW, V_{RF} = 600 mV, V_{CC} = 5 V	—	0.35	0.6	mW
Focus error signal amplitude	V_{FE}		330	550	770	mV
Tracking error signal amplitude	V_{TE}		90	150	210	mV
Tracking error signal balance	B_{TE}		−40	—	+40	%
Jitter	Jitter		—	—	25	ns

HULT276

For DVD Player/Portable DVD Player

Features

- Multi-mode dual wavelength laser diode (1 chip) eliminates the necessity of superimposing at high frequency.
- For reading DVD/CD
- CD and CD-R: Reading at 24 × speed
  DVD and DVD-R: Reading at 8 × speed
  DVD-RAM: Reading at 5 × speed

Error Signal Detection Method

- Focus error signal detection: SSD method
- Tracking error signal detection:
  CD, CD-R: 3-beam method
  DVD, DVD-R: Phase differential method
  DVD-RAM: 3-beam Push pull method

Package No.

- PKG07

Absolute Maximum Ratings

Parameter		Symbol	Ratings	Unit
Output power	DVD	$P_{O(HOE\ OUT)}$	5	mW
	CD	$P_{O(HOE\ OUT)}$	6	
Reverse voltage		$V_{R(LD)}$	1.5	V
Supply voltage		V_{CC}	6	V
Reference voltage		V_{ref}	+2.1 to +2.3	V
Operating package temperature		T_C	−10 to +75	°C
Storage temperature		T_{stg}	−40 to +85	°C

Unit Characteristic Specifications (DVD) $T_C = 25°C \pm 3°C$

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Threshold current	I_{th}	CW	25	40	65	mA
Operating current	I_{OP}	CW, V_{RF} = 820 mV, V_{CC} = 5 V	30	50	70	mA
Operating voltage	V_{OP}		—	2.4	3.2	V
Oscillation wavelength	λ	CW, $P_{O(HOE\ OUT)}$ = 3 mW	659	667	675	nm
Optical output from lens	P_O	CW, V_{RF} = 820 mV, V_{CC} = 5 V	—	0.2	0.5	mW
Focus error signal amplitude	V_{FE}		400	650	900	mV
Focus error signal balance	B_{FE}		−20	—	+20	%
Radial optical flux balance	RAB		−25	0	+25	%
Tangential optical flux balance	TAB		−25	0	+25	%
Jitter	Jitter		—	—	10	%

Unit Characteristic Specifications (CD) $T_C = 25°C \pm 3°C$

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Threshold current	I_{th}	CW	18	35	52	mA
Operating current	I_{OP}	CW, V_{RF} = 600 mV, V_{CC} = 5 V	23	40	57	mA
Operating voltage	V_{OP}		—	2.4	3.2	V
Oscillation wavelength	λ	CW, $P_{O(HOE\ OUT)}$ = 3.5 mW	775	785	805	nm
Optical output from lens	P_O	CW, V_{RF} = 600 mV, V_{CC} = 5 V	—	0.35	0.6	mW
Focus error signal amplitude	V_{FE}		330	550	770	mV
Tracking error signal amplitude	V_{TE}		90	150	210	mV
Tracking error signal balance	B_{TE}		−40	—	+40	%
Jitter	Jitter		—	—	25	ns

HUL7211

For CD Player / Portable CD Player

Features

- Low voltage drive (V_{CC} = 3 V)
- Low power consumption laser diode
- Built-in I-V conversion amp.

Error Signal Detection Method

- Focus error signal detection : SSD method
- Tracking error signal detection : 3-beam method

Package No.

- PKG01

Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Output power	P_O	3.6	mW
Reverse voltage	$V_{R(LD)}$	2	V
Supply voltage	V_{CC}	6	V
Reference voltage	V_{ref}	+1.3 to V_{CC} −1.5	V
Operating ambient temperature	T_{opr}	−10 to +60	°C
Storage temperature	T_{stg}	−40 to +85	°C

Unit Characteristic Specifications T_C = 25°C ± 3°C

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Threshold current	I_{th}	CW	15	25	35	mA
Operating current	I_{OP}	CW, V_{RF} = 330 mV, V_{CC} = 3 V	20	32	45	mA
Operating voltage	V_{OP}		—	1.9	2.4	V
Oscillation wavelength	λ	CW, $P_{O(HOE\ OUT)}$ = 1.8 mW	775	795	815	nm
Focus error signal amplitude	V_{FE}	V_{RF} = 330 mV, V_{CC} = 3 V	230	330	430	mV
Focus error signal balance	B_{FE}		−10	0	+10	%
Tracking error signal amplitude	V_{TE}		170	280	390	mV
Tracking error signal balance	B_{TE}		−30	0	+30	%
Jitter	Jitter		—	—	6	ns
Focus error signal defocusing	D_{FO}		−10	0	+10	%

HUL7212

For CD Player / Portable CD Player

Features

- Low power consumption laser diode
- Built-in I-V conversion amp.

Error Signal Detection Method

- Focus error signal detection : SSD method
- Tracking error signal detection : 3-beam method

Package No.

- PKG01

Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Output power	P_O	3.6	mW
Reverse voltage	$V_{R(LD)}$	2	V
Supply voltage	V_{CC}	6	V
Reference voltage	V_{ref}	+1.3 to V_{CC} −1.5	V
Operating ambient temperature	T_{opr}	−10 to +60	°C
Storage temperature	T_{stg}	−40 to +85	°C

Unit Characteristic Specifications $T_C = 25°C \pm 3°C$

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Threshold current	I_{th}	CW	15	25	35	mA
Operating current	I_{OP}	CW, V_{RF} = 520 mV, V_{CC} = 5 V	20	32	45	mA
Operating voltage	V_{OP}		—	1.9	2.4	V
Oscillation wavelength	λ	CW, $P_{O(HOE\ OUT)}$ = 1.8 mW	785	800	815	nm
Focus error signal amplitude	V_{FE}	V_{RF} = 520 mV, V_{CC} = 5 V	260	440	620	mV
Focus error signal balance	B_{FE}		−10	0	+10	%
Tracking error signal amplitude	V_{TE}		170	280	390	mV
Tracking error signal balance	B_{TE}		−30	0	+30	%
Jitter	Jitter		—	—	6	ns
Focus error signal defocusing	D_{FO}		−10	0	+10	%

HUL7215

For CD Player / Portable CD Player

Features

- Low voltage drive (V_{CC}= 3 V)
- Low power consumption laser diode
- Built-in I-V conversion amp.

Error Signal Detection Method

- Focus error signal detection: SSD method
- Tracking error signal detection: 3-beam method

Package No.

- PKG01-6

Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Output power	P_O	3.6	mW
Reverse voltage	$V_{R(LD)}$	2	V
Supply voltage	V_{CC}	6	V
Reference voltage	V_{ref}	+1.3 to V_{CC} −1.5	V
Operating ambient temperature	T_{opr}	−10 to +60	°C
Storage temperature	T_{stg}	−40 to +85	°C

Unit Characteristic Specifications T_C = 25°C ± 3°C

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Threshold current	I_{th}	CW	15	25	35	mA
Operating current	I_{OP}	CW, V_{RF} = 330 mV, V_{CC} = 3 V	20	32	45	mA
Operating voltage	V_{OP}		—	1.9	2.4	V
Oscillation wavelength	λ	CW, $P_{O(HOE\ OUT)}$ = 1.8 mW	775	795	815	nm
Focus error signal amplitude	V_{FE}	V_{RF} = 330 mV, V_{CC} = 3 V	230	380	530	mV
Focus error signal balance	B_{FE}		−10	0	+10	%
Tracking error signal amplitude	V_{TE}		170	280	390	mV
Tracking error signal balance	B_{TE}		−30	0	+30	%
Jitter	Jitter		—	—	6	ns
Focus error signal defocusing	D_{FO}		−10	0	+10	%

HUL7258

For CD Player / Portable CD Player

Features

- Low voltage drive (V_{CC}= 3 V)
- Built-in I-V conversion amp.
- Low power consumption laser diode
- Thin package is adopted

Error Signal Detection Method

- Focus error signal detection : SSD method
- Tracking error signal detection : 3-beam method

Package No.

- PKG03

Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Output power	P_O	3.6	mW
Reverse voltage	$V_{R(LD)}$	2	V
Supply voltage	V_{CC}	6	V
Reference voltage	V_{ref}	+1.3 to V_{CC} −1.5	V
Operating ambient temperature	T_{opr}	−10 to +60	°C
Storage temperature	T_{stg}	−40 to +85	°C

Unit Characteristic Specifications T_C = 25°C ± 3°C

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Threshold current	I_{th}	CW	15	25	35	mA
Operating current	I_{OP}	CW, V_{RF} = 330 mV, V_{CC} = 3 V	20	32	45	mA
Operating voltage	V_{OP}		—	1.9	2.4	V
Oscillation wavelength	λ	CW, $P_{O(HOE\ OUT)}$ = 1.8 mW	775	795	815	nm
Optical output from lens	P_O	V_{RF} = 330 mV, V_{CC} = 3 V	—	0.18	0.25	mW
Focus error signal amplitude	V_{FE}		200	330	460	mV
Focus error signal balance	B_{FE}		−10	0	+10	%
Tracking error signal amplitude	V_{TE}		170	280	390	mV
Tracking error signal balance	B_{TE}		−30	0	+30	%
Jitter	Jitter		—	—	6	ns
Focus error signal defocusing	D_{FO}		−8	0	+8	%

Laser Diode

Package No.

Frame PKG15

Appearance

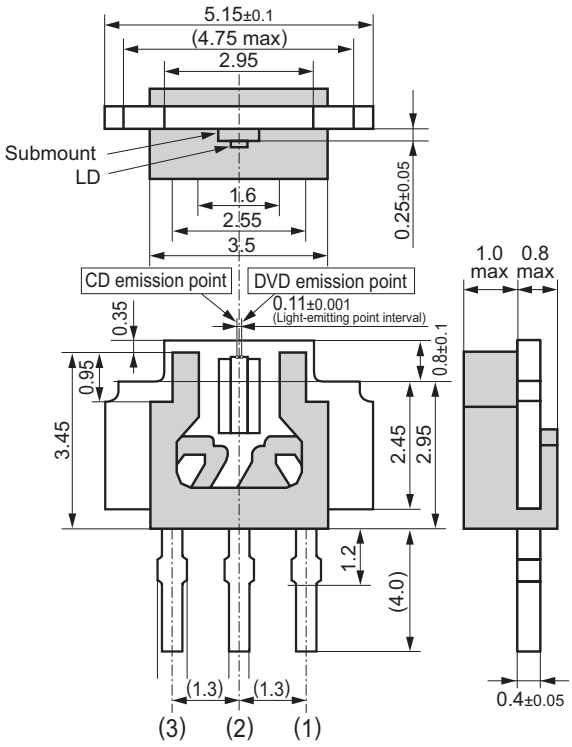
Part No.

- LNCT12PF
- LNCT16PF

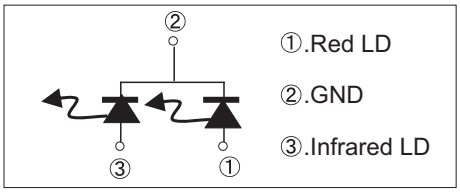
Outline

The shape, dimensions, etc. shown in the appearance diagram are for reference only. Detailed information will be provided through consultations with individual customers. Please contact the nearest sales office for further information.

Unit : mm



Internal Connection



Package No.

Frame PKG17

Appearance

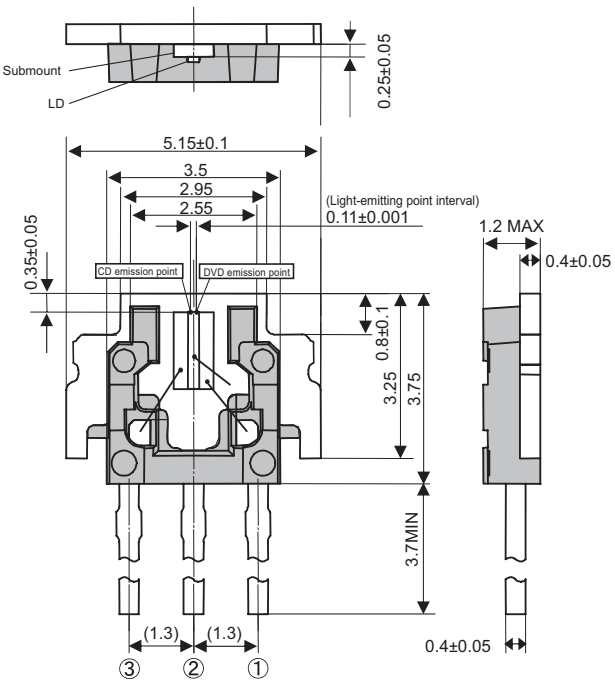
Part No.

● LNCT21PU

Outline

The shape, dimensions, etc. shown in the appearance diagram are for reference only. Detailed information will be provided through consultations with individual customers. Please contact the nearest sales office for further information.

Unit : mm



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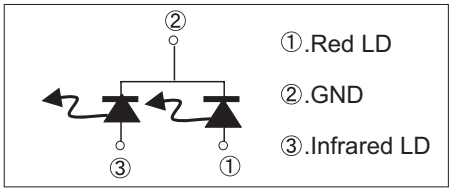


Under development

Package No.

3.8CAN PKG

Appearance

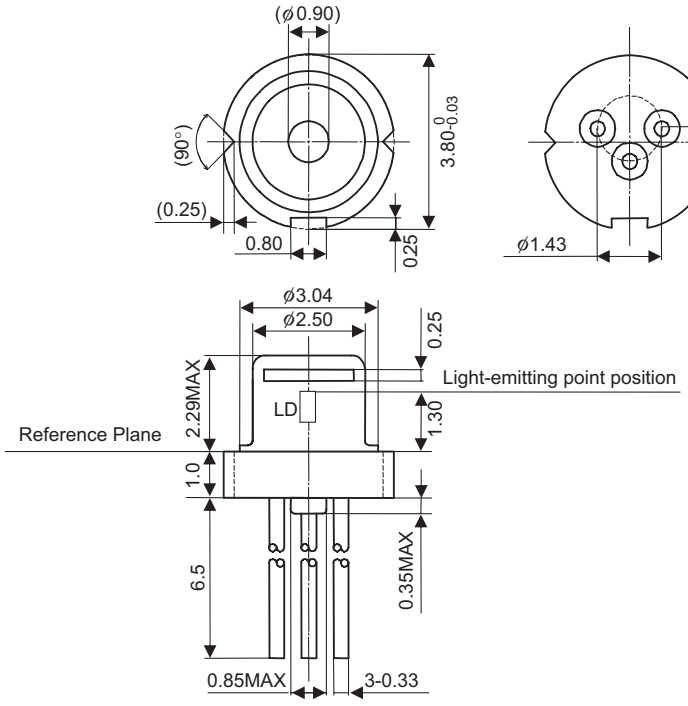
Part No.

● LNC415FG

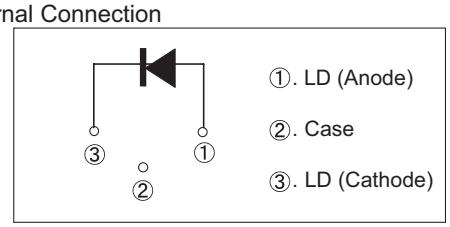
Outline

The shape, dimensions, etc. shown in the appearance diagram are for reference only. Detailed information will be provided through consultations with individual customers. Please contact the nearest sales office for further information.

Unit : mm



Internal Connection

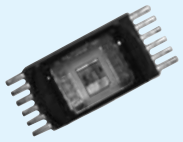


Hologram Unit

Package No.

PKG01

Appearance



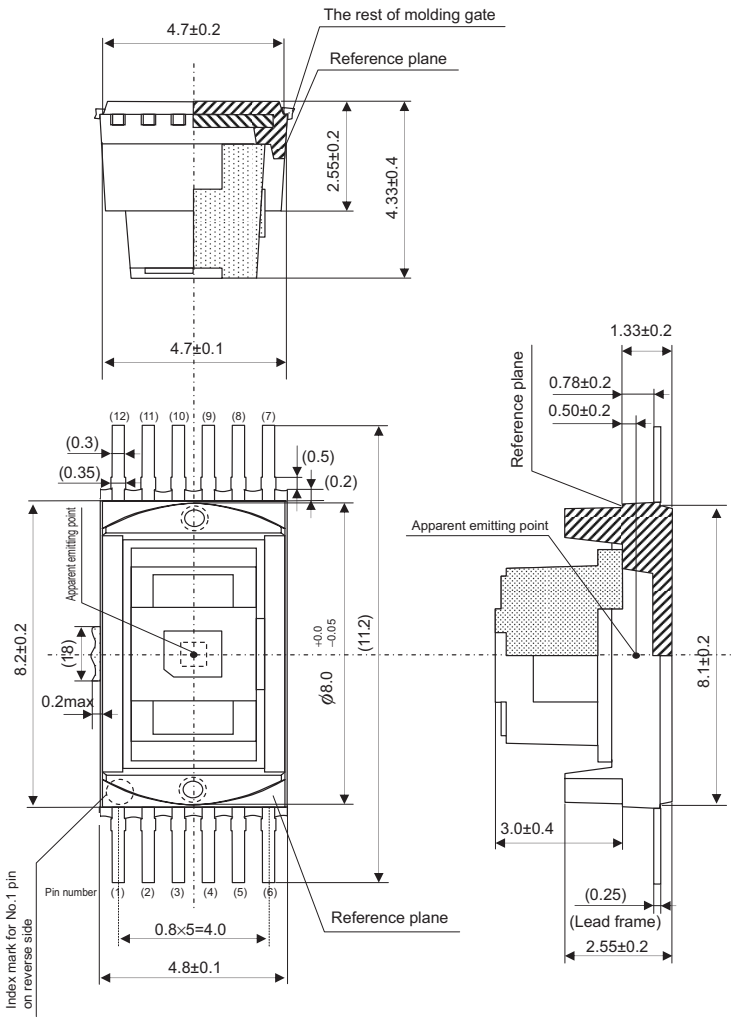
Part No.

- HUL7211
- HUL7212

Outline

The shape, dimensions, etc. shown in the appearance diagram are for reference only. Detailed information will be provided through consultations with individual customers. Please contact the nearest sales office for further information.

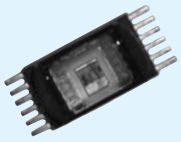
Unit : mm



Package No.

PKG01-6

Appearance



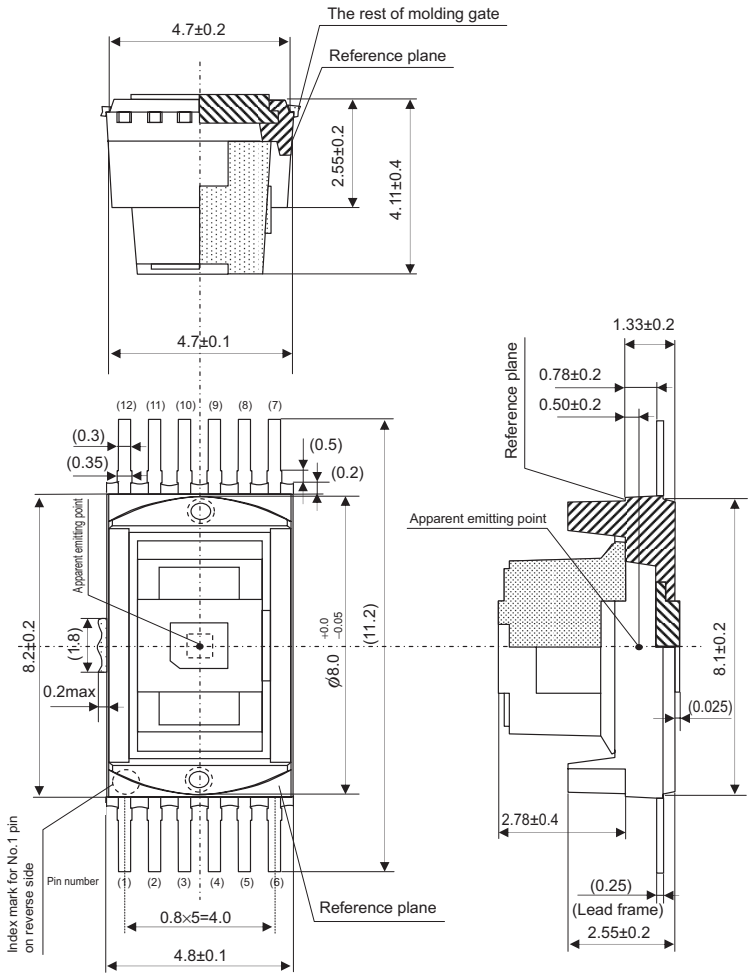
Part No.

● HUL7215

Outline

The shape, dimensions, etc. shown in the appearance diagram are for reference only. Detailed information will be provided through consultations with individual customers. Please contact the nearest sales office for further information.

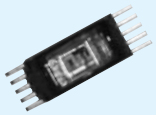
Unit : mm



Package No.

PKG03

Appearance



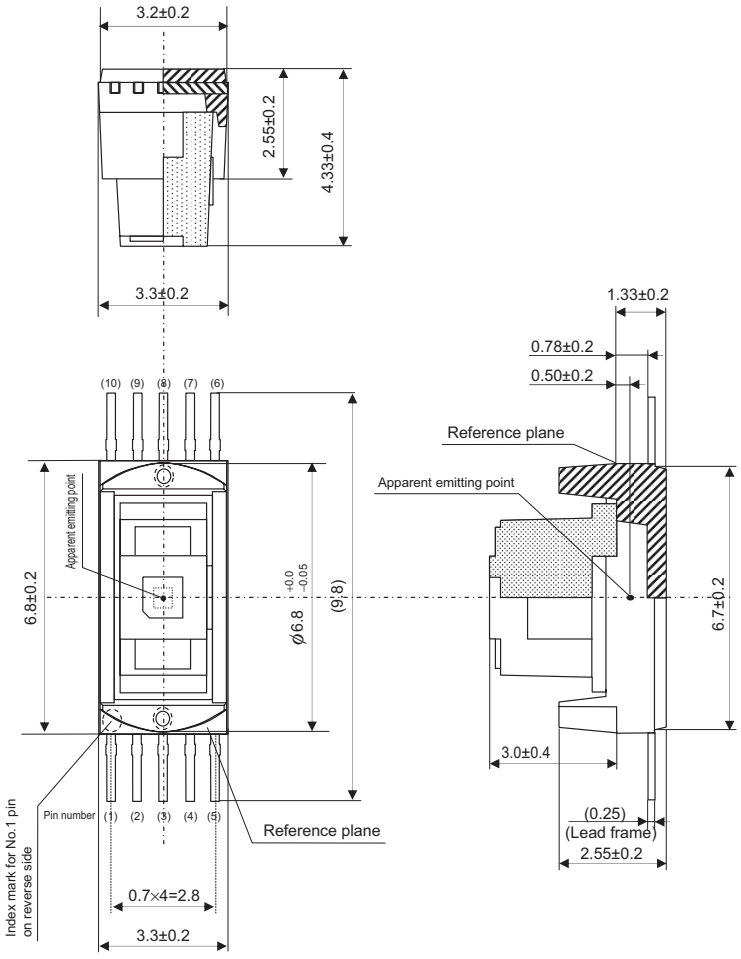
Part No.

● HUL7258

Outline

The shape, dimensions, etc. shown in the appearance diagram are for reference only. Detailed information will be provided through consultations with individual customers. Please contact the nearest sales office for further information.

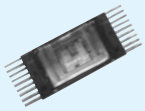
Unit : mm



Package No.

PKG07

Appearance



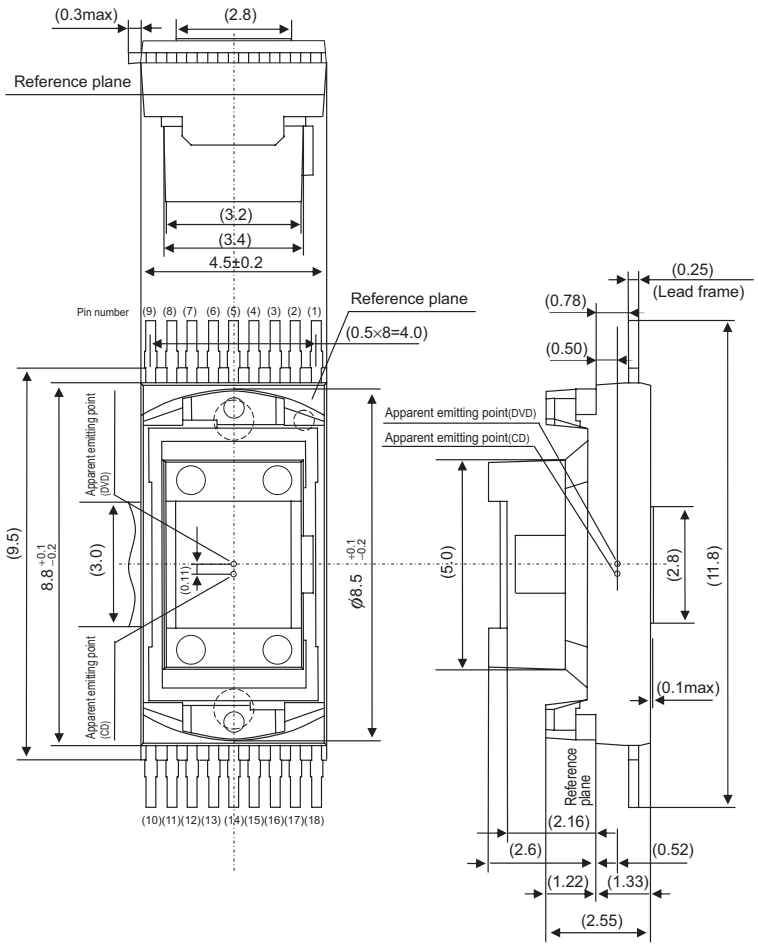
Part No.

- HULT273
- HULT276

Outline

The shape, dimensions, etc. shown in the appearance diagram are for reference only. Detailed information will be provided through consultations with individual customers. Please contact the nearest sales office for further information.

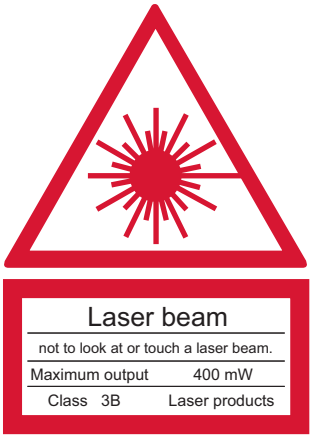
Unit : mm



Caution for Using Laser Diodes

(1) A laser beam is harmful to human eyes. Never look at active laser directly or through lens.
(2) Caution must be exercised in preventing electrostatic damage while handling the laser diode. To ensure human grounding (via 1 MΩ), use a conductive mat on the floor, conductive sole shoes, conductive containers, etc. Always ground the tip of solder iron.
(3) Laser diode can be damaged by abnormal pulses from nearby equipment. For example, fluorescent lamps should never be turned on/off near laser diodes.
(4) Never exceed the absolute maximum rated values. It is especially important not to exceed the absolute maximum output even momentarily.
(5) Check the transition characteristics of the entire driving circuit including the power supply. Take appropriate measures to avoid events such as spike current generated when the power switch is turned on/off which may exceed the laser diode's maximum rating.
(6) We recommend keeping the actual design targets below 2/3 the maximum ratings.
(7) Appropriate protective circuitry must be provided in each laser circuit.
(8) Attention must be paid to providing adequate means for heat dissipation. A copper plate of 50 mm × 50 mm × 2 mm or similar heat dissipation device of adequate dissipation should be used as a heat sink.

● The following warning labels are used to indicate the danger of laser beams.



⚠ Caution for Safety	
⚠ DANGER	Do not touch or look at a laser beam directly. It is in danger of a injury to eyesight or outer skin in the worst case.

Pub. No.A00035FE

Laser Diode/Hologram Unit for Optical Disk

October 1, 2008 6th Edition

Issued by

Panasonic Corporation

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20081001-1 Printed in Japan