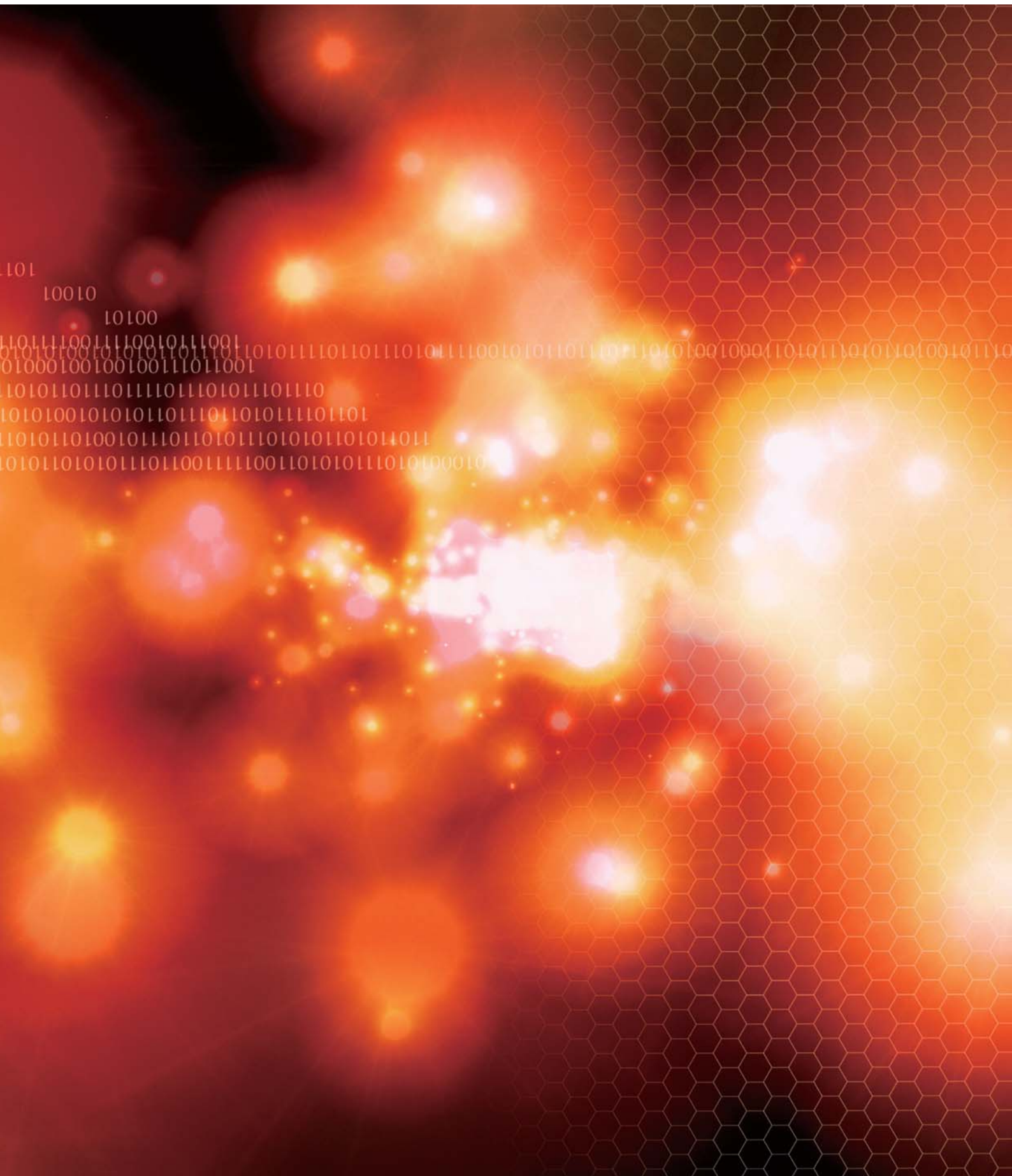


Panasonic
ideas for life

2009

**Laser / Hologram Unit
for Optical Disk**



Caution for Safety

 **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.

Request for your special attention and precautions in using the technical information and semiconductors described in this book

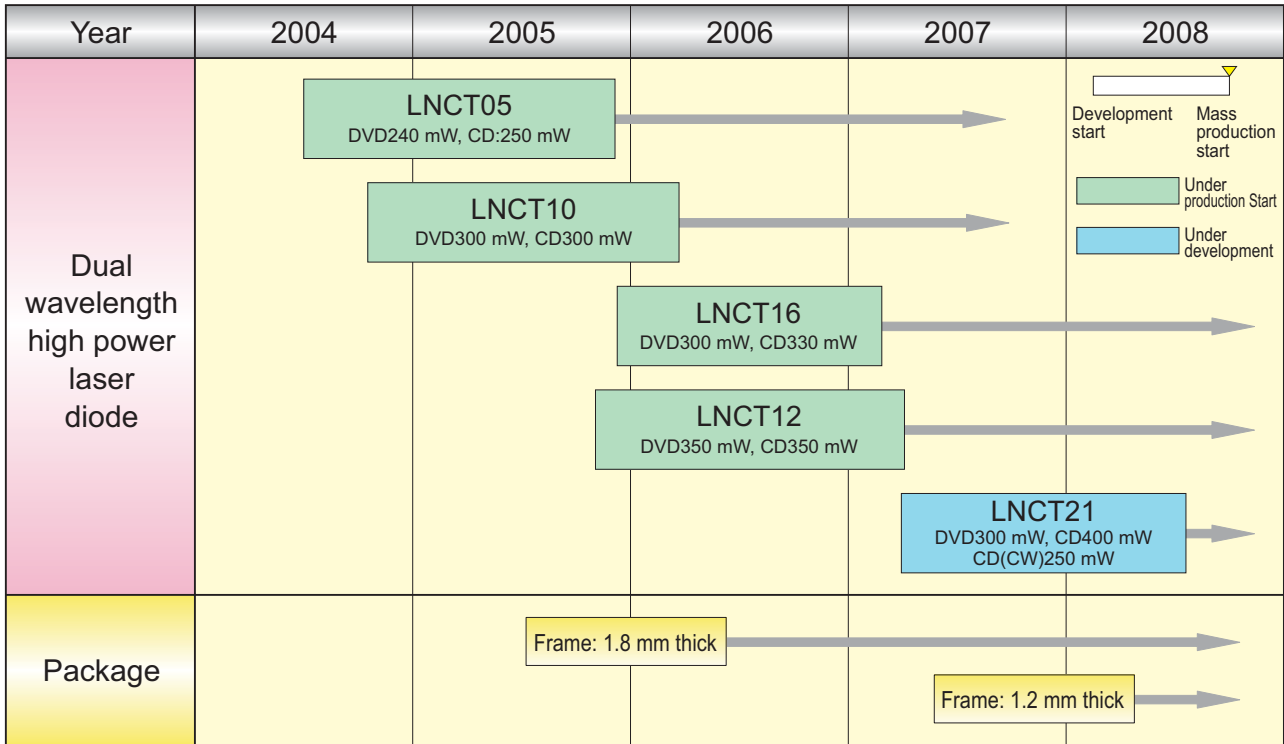
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Roadmap



Specification List

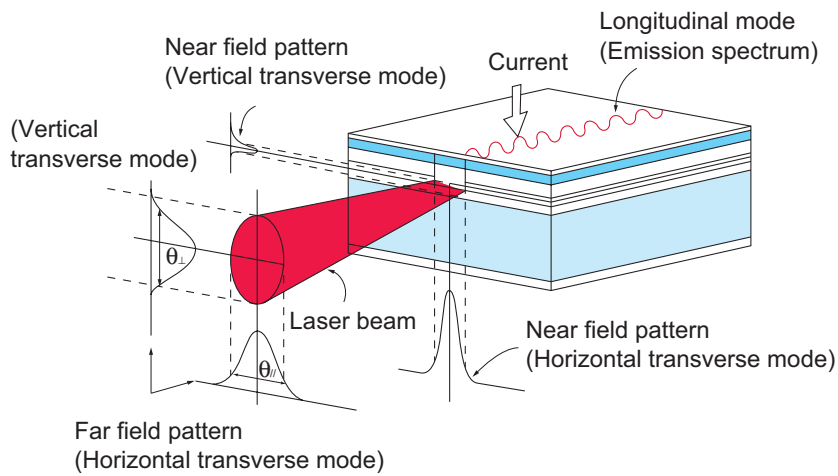
Application	Part No.		Features	Electro/Optical Characteristics (Standard Values; T _c = 25°C)							Package No.	Page
				P _O max (mW)	I _{th} (mA)	I _{op} (mA)	V _{op} (V)	λ (nm)	Differential efficiency (W/A)	Coherent length (mm)		
Dual wavelength high power for DVD/CD write/read	LNCT12PF	DVD	Pulsed 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						
	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						
	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
		CD	Pulsed light output 400 mW 100 ns, 50%	400	55	CW, P _O = 160 mW 215 2.45 785						1.0

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 (30 ns, 50%)	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.

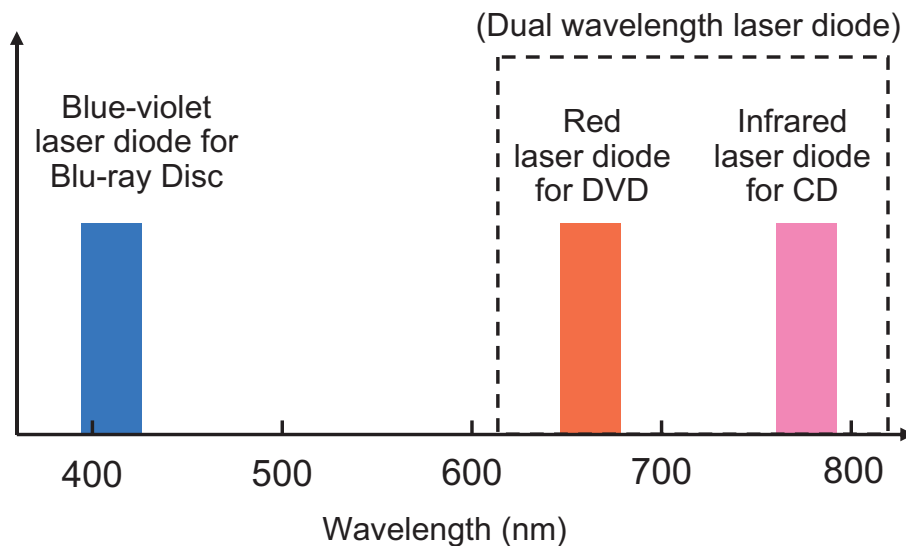
The laser diode is widely used as the light source for reading and writing of various optical disks.



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.



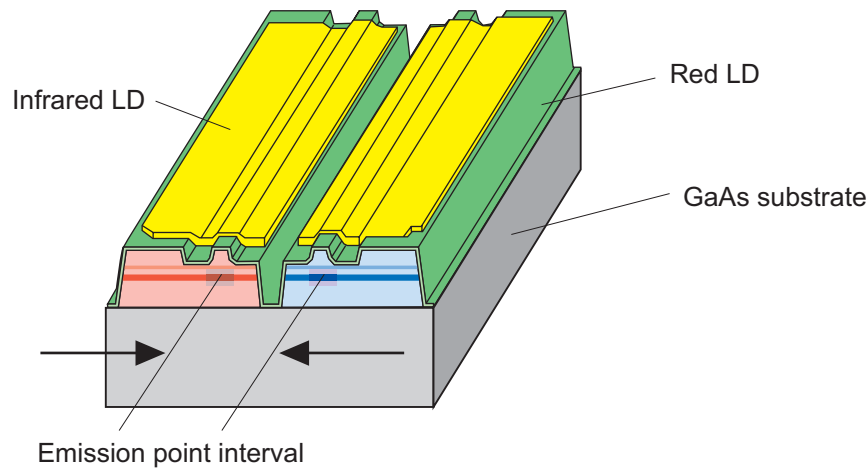
Dual wavelength laser diode structure

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.

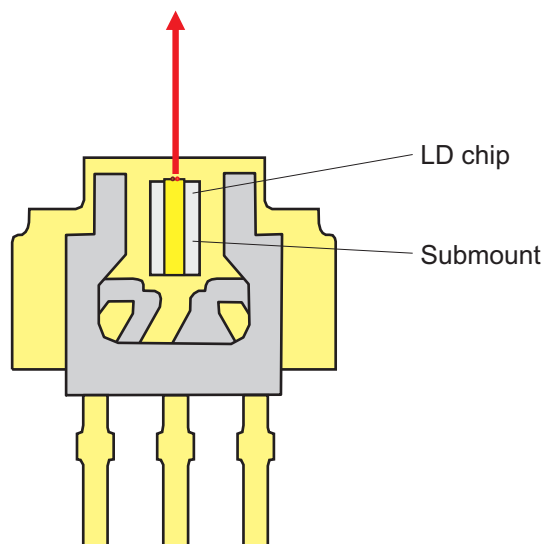


Assembly appearance (Frame package)

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.

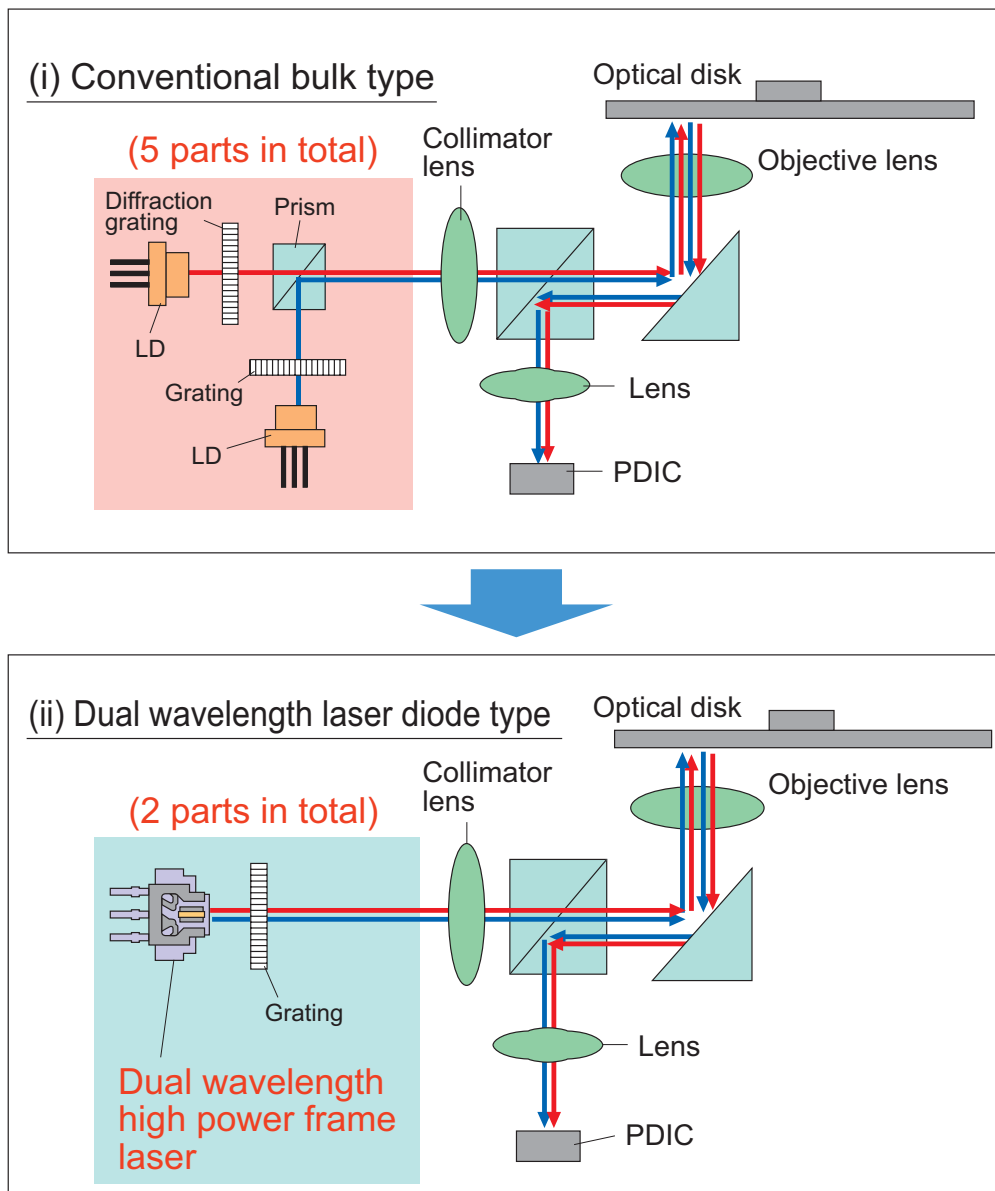


Optical pickup system simplified

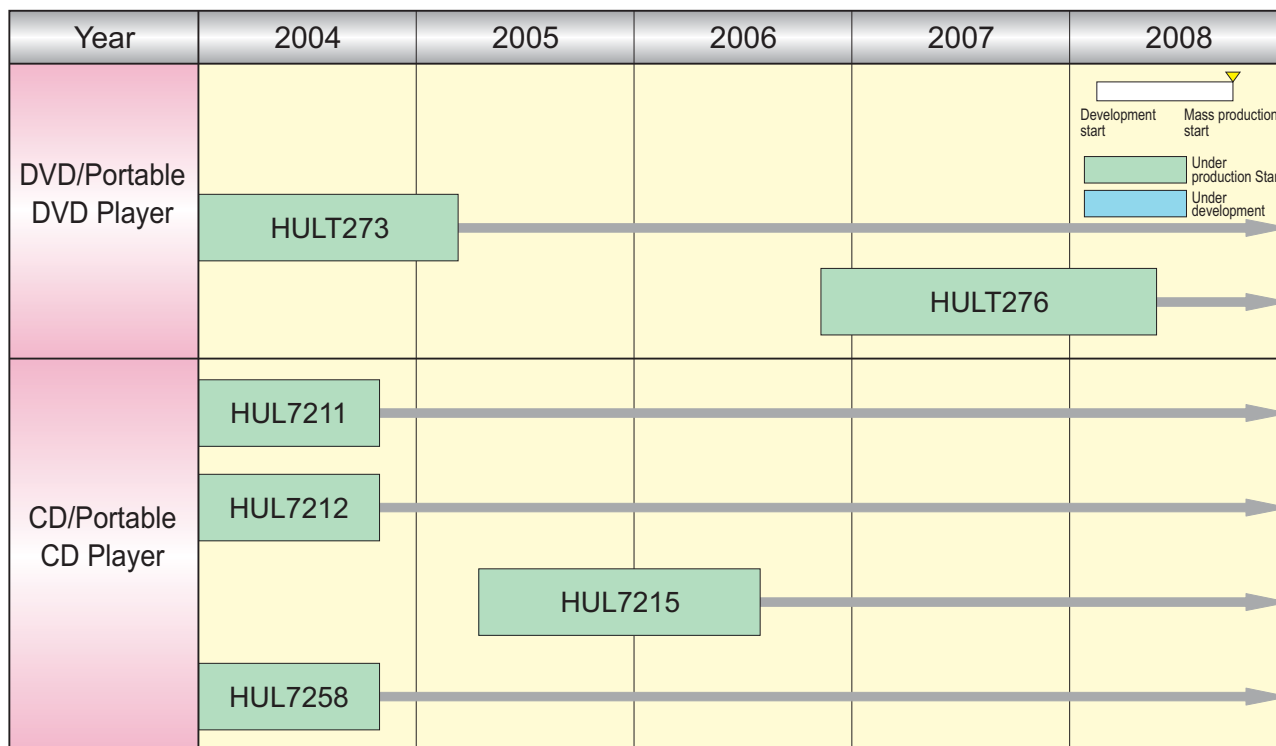
The figures below offer comparison of the optical pickup for writing DVD and CD between (i) conventional bulk type structure in which two CAN laser diodes are used and (ii) dual wavelength laser diode type structure in which one dual wavelength laser frame package is used.

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	<ul style="list-style-type: none"> 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
	HULT276	<ul style="list-style-type: none"> 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 							20 21
CD/Portable CD Player	HUL7211	<ul style="list-style-type: none"> Low voltage drive ($V_{CC} = 3$ V) Low power consumption laser diode Built-in I-V conversion amp. 	SSD method	3-beam method	3.6	795	PKG01	PKG01-6	22
	HUL7212	<ul style="list-style-type: none"> Low power consumption laser diode Built-in I-V conversion amp. 							23
	HUL7215	<ul style="list-style-type: none"> Low voltage drive ($V_{CC} = 3$ V) Low power consumption laser diode Built-in I-V conversion amp. 							24
	HUL7258	<ul style="list-style-type: none"> Low voltage drive ($V_{CC} = 3$ V) Built-in I-V conversion amp. Low power consumption laser diode Ultra thin package is adopted 							25

On the Hologram Unit

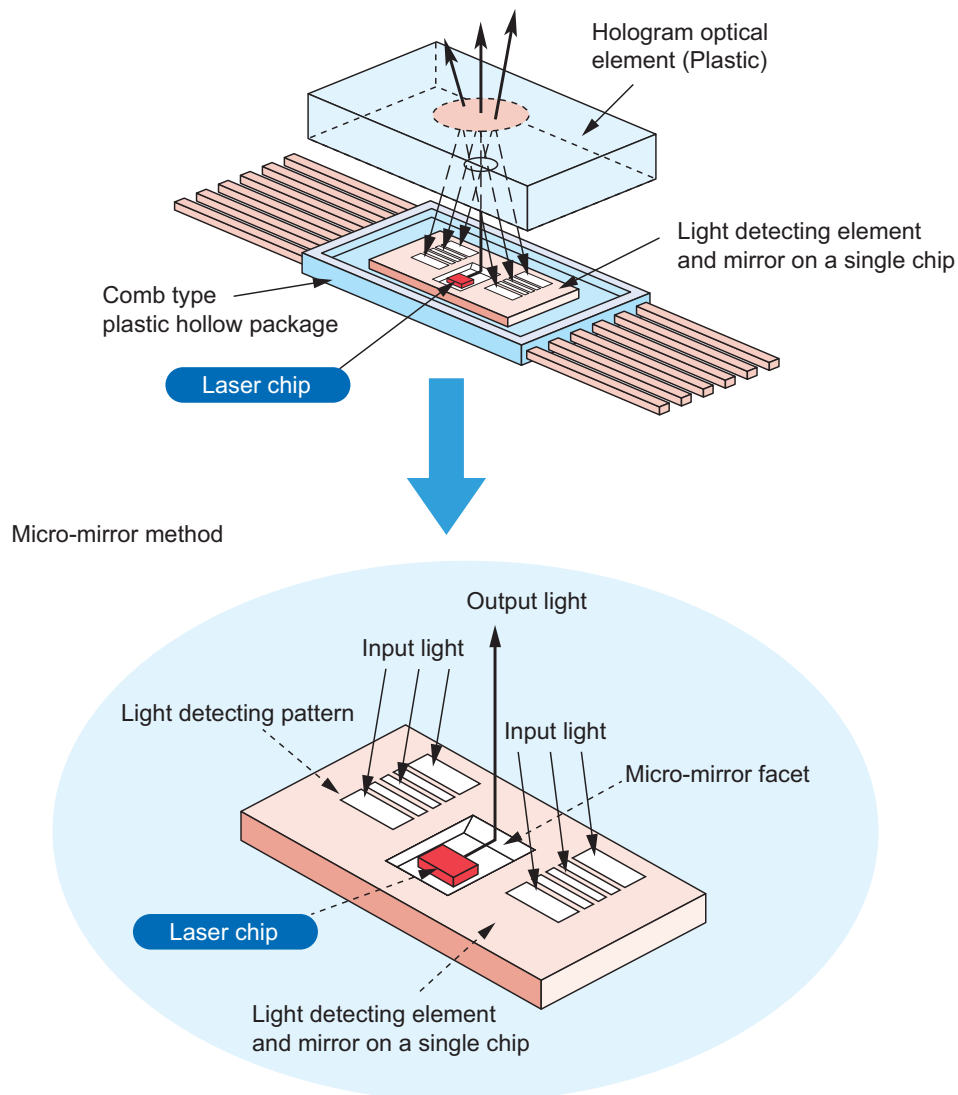
Hologram Unit, as it's revealing on its name, sophisticated optical diffractive hologram design enables to integrate the plural optical pickup functions into a compact package. Laser diode, signal detecting photo-diode IC, diffractive grating and beam splitter functions are built in compact plastic package 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.

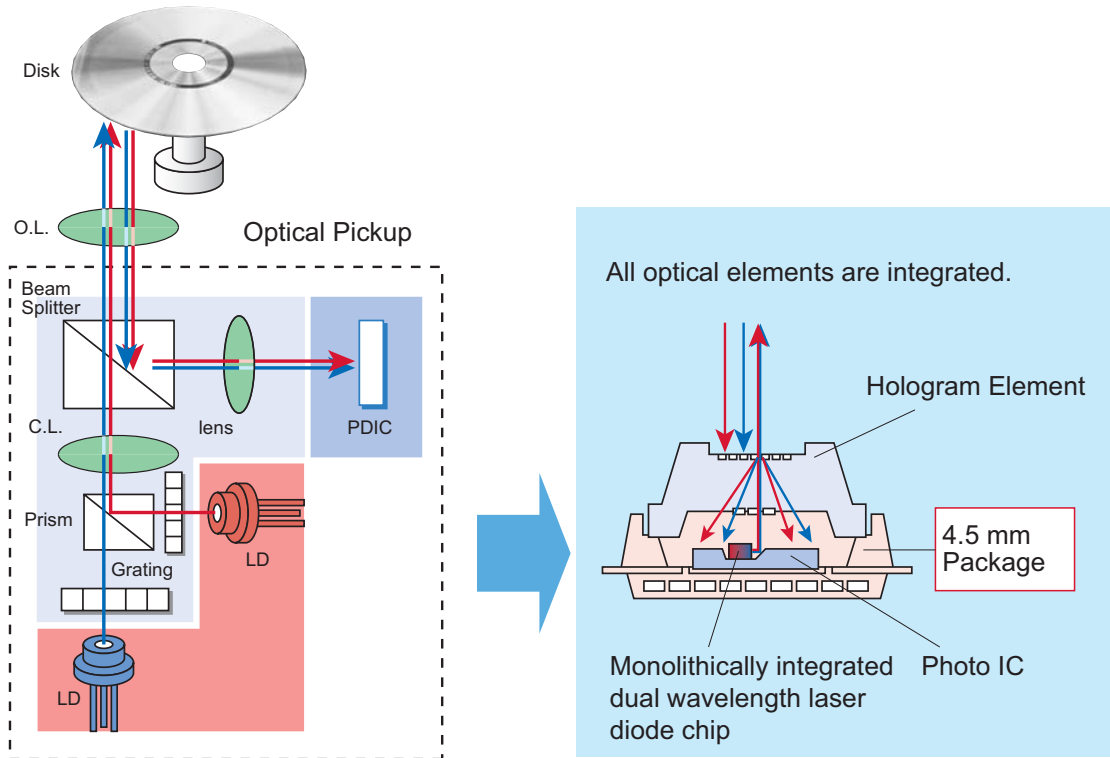
Built-in high speed photo-diode ICs are designed for CD and DVD/CD applications to realize the highest performances, respectively.

Hologram Unit Configuration



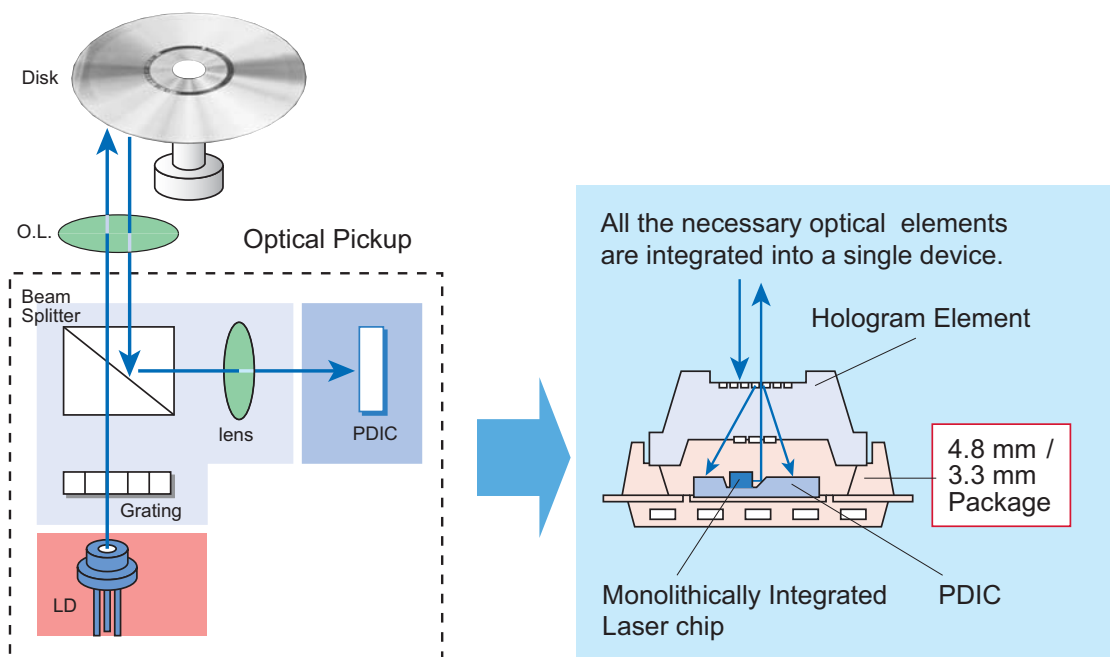
Configuration of DVD Pickup

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

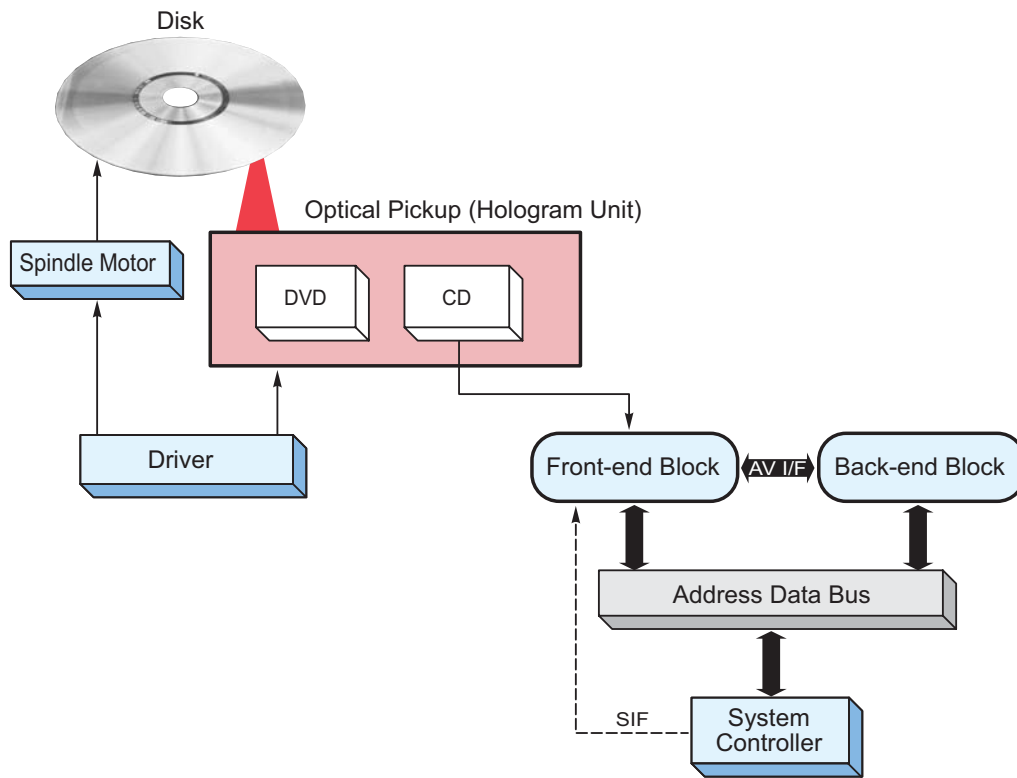


Configuration of CD Pickup

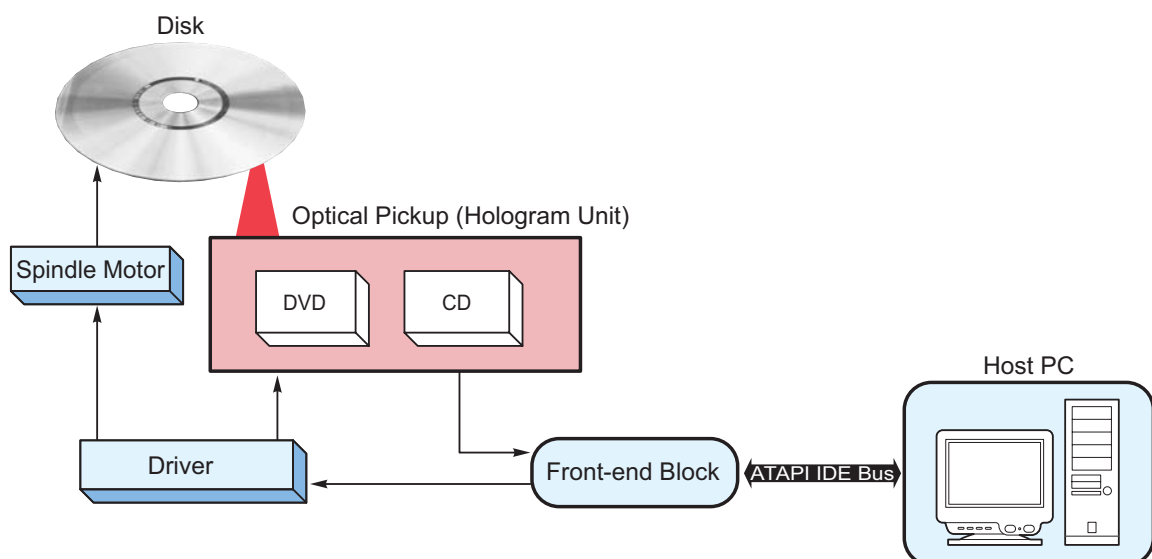
All of the five devices consisting the optical pickup are integrated into a single unit.



Block Diagram: DVD Player



Block Diagram: DVD-ROM Drive



Laser Diode

LNCT12PFRed/Infrared Dual Wavelength Laser Diode 12
(Record and reproduction for DVD/CD)**LNCT16PF**Red/Infrared Dual Wavelength Laser Diode 13
(Record and reproduction for DVD/CD)**LNCT21PU**Red/Infrared Dual Wavelength Laser Diode 14
(Record and reproduction for DVD/CD)**LNC415FG**Blue-violet Ultra High Power Laser Diode 16
(Record for Blu-ray Disc)

Specifications (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 $T_C = 25^\circ\text{C}$

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,	—	150	200	—	215	260	mA
Operating voltage	V_{op}	$P_O = 100$ mW(DVD) $P_O = 150$ mW(CD)	—	2.4	3.0	—	2.4	3.0	V
Oscillation wavelength	λ		656	661	664	779	785	791	nm
Radiation angle	Horizontal	θ_h	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	$\Delta\theta_{//}$	/			-2	—	+2	deg
	Vertical	$\Delta\theta_{\perp}$	/			-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 $T_C = 25^\circ\text{C}$, 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	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 $T_C = 25^\circ\text{C}$

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,	115	130	170	170	215	250	mA
Operating voltage	V_{op}	$P_O = 90 \text{ mW(DVD)}$ $P_O = 160 \text{ mW(CD)}$	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	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	$\Delta\theta_{//}$	/			-2	—	+2	deg
	Vertical	$\Delta\theta_{\perp}$				-2	—	+2	deg
Differential efficiency	η	CW, $P_O = 5 - 90 \text{ mW(DVD)}$ $P_O = 5 - 160 \text{ mW(CD)}$	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, $P_O = 5 \text{ mW}$	12	—	—	12	—	—	—
Coherent length	nL	—	6.20	6.25	6.29	5.51	5.55	5.59	mm

*1: Case temperature $T_C = 25^\circ\text{C}$, DVD laser pulse condition: Pulse width = 30 ns, duty = 35%,
CD laser pulse condition: Pulse width = 100 ns, duty = 50% unless otherwise specified

Specifications (Laser Diode)

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	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) $T_C = 25^\circ\text{C}$

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	CW, $P_O = 5, 90$ mW	656	661	665	nm
Radiation angle	Horizontal θ_h		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 $T_C = 25^\circ\text{C}$, DVD laser pulse condition: Pulse width = 30 ns, duty = 35%,
CD laser pulse condition: Pulse width = 100 ns, duty = 50% unless otherwise specified

Specifications (Laser Diode)

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) $T_C = 25^\circ\text{C}$

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		6.5	—	11.5	deg	
	Vertical θ_v	12	—	18	deg		
Radiation angle power fluctuation	Horizontal $\Delta\theta_h$	CW, $P_O = 5, 160$ mW	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 $T_C = 25^\circ\text{C}$, DVD laser pulse condition: Pulse width = 30 ns, duty = 35%,
CD laser pulse condition: Pulse width = 100 ns, duty = 50% unless otherwise specified

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

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	—	8	—	deg
	Vertical	θ_v	—	18	—	deg

*1 Unless otherwise noted, case temperature $T_C = 25^\circ\text{C}$. Pulse condition is pulse width = 30 ns, duty = 50%.

Hologram Unit

HULT273	For DVD Player/ Portable DVD Player	18
HULT276	For DVD Player/ Portable DVD Player	20
HUL7211	For CD Player / Portable CD Player	22
HUL7212	For CD Player / Portable CD Player	23
HUL7215	For CD Player/ Portable CD Player	24
HUL7258	For CD Player/ Portable CD Player	25

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) $T_C = 25^\circ\text{C} \pm 3^\circ\text{C}$

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Threshold current	I_{th}	CW	5	15	30	mA
Operating current	I_{OP}	CW, $V_{RF} = 820\text{ mV}$, $V_{CC} = 5\text{ V}$	10	20	35	mA
Operating voltage	V_{OP}		—	2.1	3.0	V
Oscillation wavelength	λ	CW, $P_{O(HOE\ OUT)} = 5\text{ mW}$	659	667	675	nm
Optical output from lens	P_O	CW, $V_{RF} = 820\text{ mV}$, $V_{CC} = 5\text{ V}$	—	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	%

Specifications (Hologram Unit)

Unit Characteristic Specifications (CD) $T_C = 25^\circ\text{C} \pm 3^\circ\text{C}$

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Threshold current	I_{th}	CW	5	15	30	mA
Operating current	I_{OP}	CW, $V_{RF} = 600 \text{ mV}$, $V_{CC} = 5 \text{ V}$	10	20	35	mA
Operating voltage	V_{OP}		—	2.0	3.0	V
Oscillation wavelength	λ	CW, $P_{O(HOE\ OUT)} = 7 \text{ mW}$	775	785	805	nm
Optical output from lens	P_O	CW, $V_{RF} = 600 \text{ mV}$, $V_{CC} = 5 \text{ V}$	—	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) $T_C = 25^\circ\text{C} \pm 3^\circ\text{C}$

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Threshold current	I_{th}	CW	25	40	65	mA
Operating current	I_{OP}	CW, $V_{RF} = 820 \text{ mV}$, $V_{CC} = 5 \text{ V}$	30	50	70	mA
Operating voltage	V_{OP}		—	2.4	3.2	V
Oscillation wavelength	λ	CW, $P_{O(HOE OUT)} = 3 \text{ mW}$	659	667	675	nm
Optical output from lens	P_O	CW, $V_{RF} = 820 \text{ mV}$, $V_{CC} = 5 \text{ V}$	—	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	%

Specifications (Hologram Unit)

Unit Characteristic Specifications (CD) $T_C = 25^\circ\text{C} \pm 3^\circ\text{C}$

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Threshold current	I_{th}	CW	18	35	52	mA
Operating current	I_{OP}	CW, $V_{RF} = 600 \text{ mV}$, $V_{CC} = 5 \text{ V}$	23	40	57	mA
Operating voltage	V_{OP}		—	2.4	3.2	V
Oscillation wavelength	λ	CW, $P_{O(HOE OUT)} = 3.5 \text{ mW}$	775	785	805	nm
Optical output from lens	P_O	CW, $V_{RF} = 600 \text{ mV}$, $V_{CC} = 5 \text{ V}$	—	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 ($V_{CC} = 3\text{ V}$)
- 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 $T_C = 25^\circ\text{C} \pm 3^\circ\text{C}$

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Threshold current	I_{th}	CW	15	25	35	mA
Operating current	I_{OP}	CW, $V_{RF} = 330\text{ mV}$, $V_{CC} = 3\text{ V}$	20	32	45	mA
Operating voltage	V_{OP}		—	1.9	2.4	V
Oscillation wavelength	λ	CW, $P_{O(HOE\ OUT)} = 1.8\text{ mW}$	775	795	815	nm
Focus error signal amplitude	V_{FE}	$V_{RF} = 330\text{ mV}$, $V_{CC} = 3\text{ V}$	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 $T_C = 25^\circ\text{C} \pm 3^\circ\text{C}$

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Threshold current	I_{th}	CW	15	25	35	mA
Operating current	I_{OP}	CW, $V_{RF} = 520\text{ mV}$, $V_{CC} = 5\text{ V}$	20	32	45	mA
Operating voltage	V_{OP}		—	1.9	2.4	V
Oscillation wavelength	λ	CW, $P_{O(HOE\ OUT)} = 1.8\text{ mW}$	785	800	815	nm
Focus error signal amplitude	V_{FE}	$V_{RF} = 520\text{ mV}$, $V_{CC} = 5\text{ V}$	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 ($V_{CC} = 3\text{ V}$)
- 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 $T_C = 25^\circ\text{C} \pm 3^\circ\text{C}$

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Threshold current	I_{th}	CW	15	25	35	mA
Operating current	I_{OP}	CW, $V_{RF} = 330\text{ mV}$, $V_{CC} = 3\text{ V}$	20	32	45	mA
Operating voltage	V_{OP}		—	1.9	2.4	V
Oscillation wavelength	λ	CW, $P_{O(HOE\ OUT)} = 1.8\text{ mW}$	775	795	815	nm
Focus error signal amplitude	V_{FE}	$V_{RF} = 330\text{ mV}$, $V_{CC} = 3\text{ V}$	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 ($V_{CC} = 3\text{ V}$)
- 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 $T_C = 25^\circ\text{C} \pm 3^\circ\text{C}$

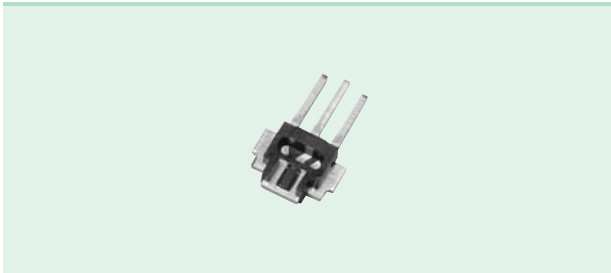
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Threshold current	I_{th}	CW	15	25	35	mA
Operating current	I_{OP}	CW, $V_{RF} = 330\text{ mV}$, $V_{CC} = 3\text{ V}$	20	32	45	mA
Operating voltage	V_{OP}		—	1.9	2.4	V
Oscillation wavelength	λ	CW, $P_{O(HOE\ OUT)} = 1.8\text{ mW}$	775	795	815	nm
Optical output from lens	P_O	$V_{RF} = 330\text{ mV}$, $V_{CC} = 3\text{ V}$	—	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

Frame PKG15	28
Frame PKG17	29
3.8CAN PKG	30

Package No.
Frame PKG15

Appearance



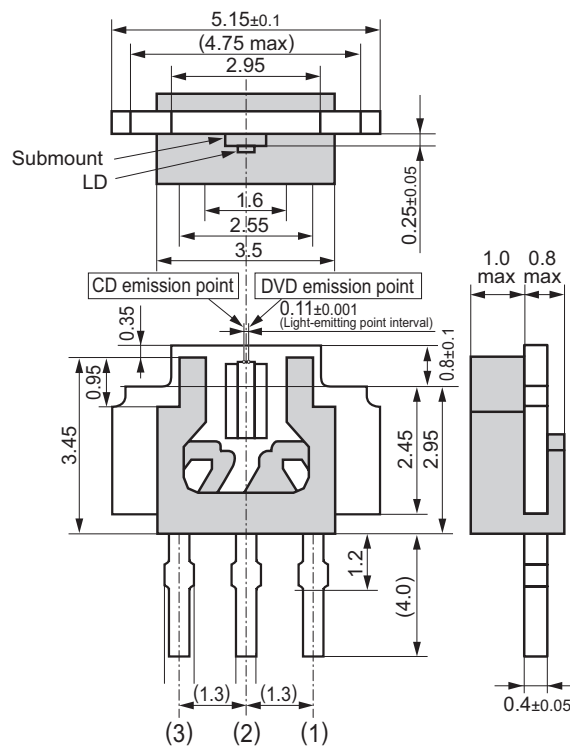
Part No.

- LNCT12PF
- LNCT16PF

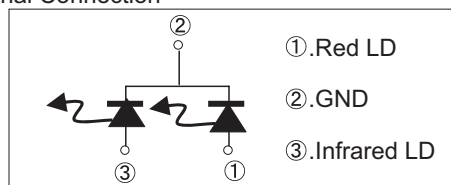
Outline

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



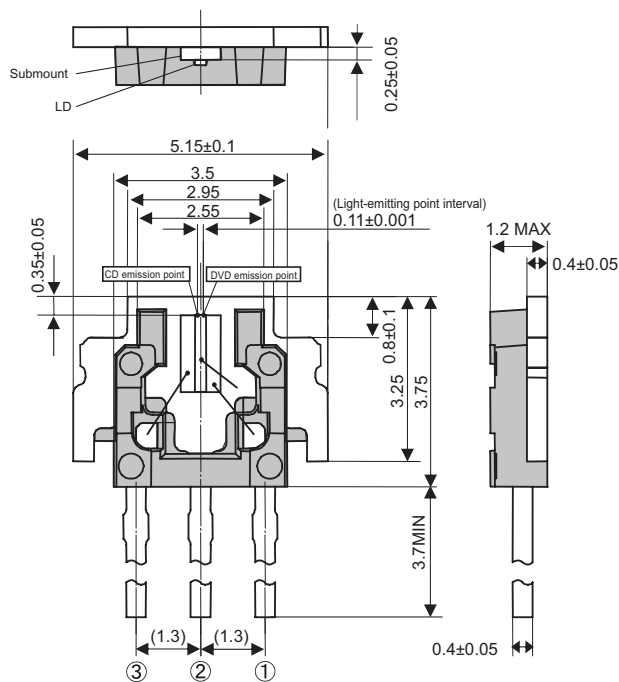
Part No.

● LNCT21PU

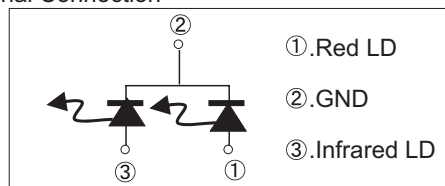
Outline

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Unit : mm

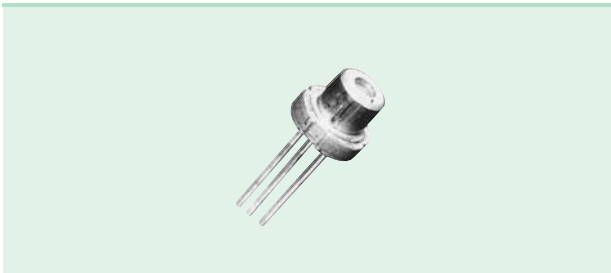


Internal Connection



Package No.
3.8CAN PKG

Appearance



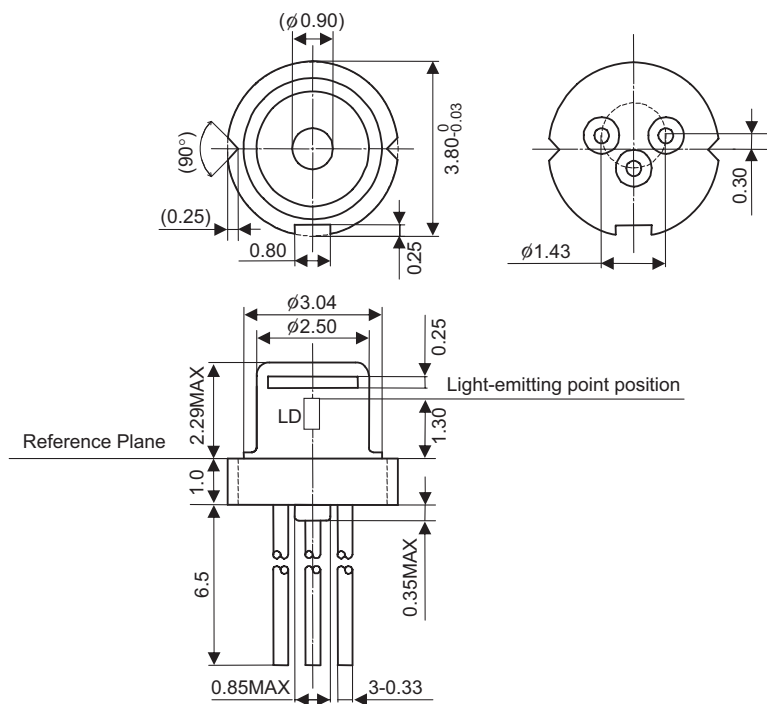
Part No.

●LNC415FG

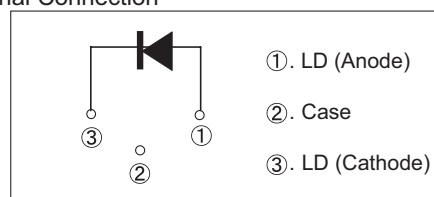
Outline

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Unit : mm



Internal Connection

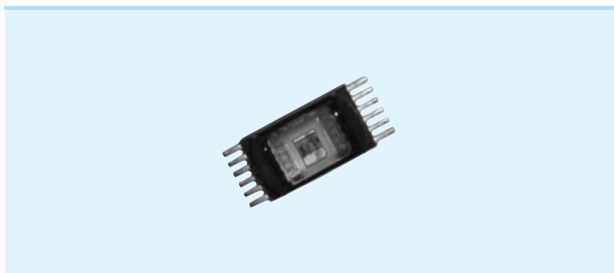


Hologram Unit

PKG01	32
PKG01-6	33
PKG03	34
PKG07	35

Package No. **PKG01**

Appearance

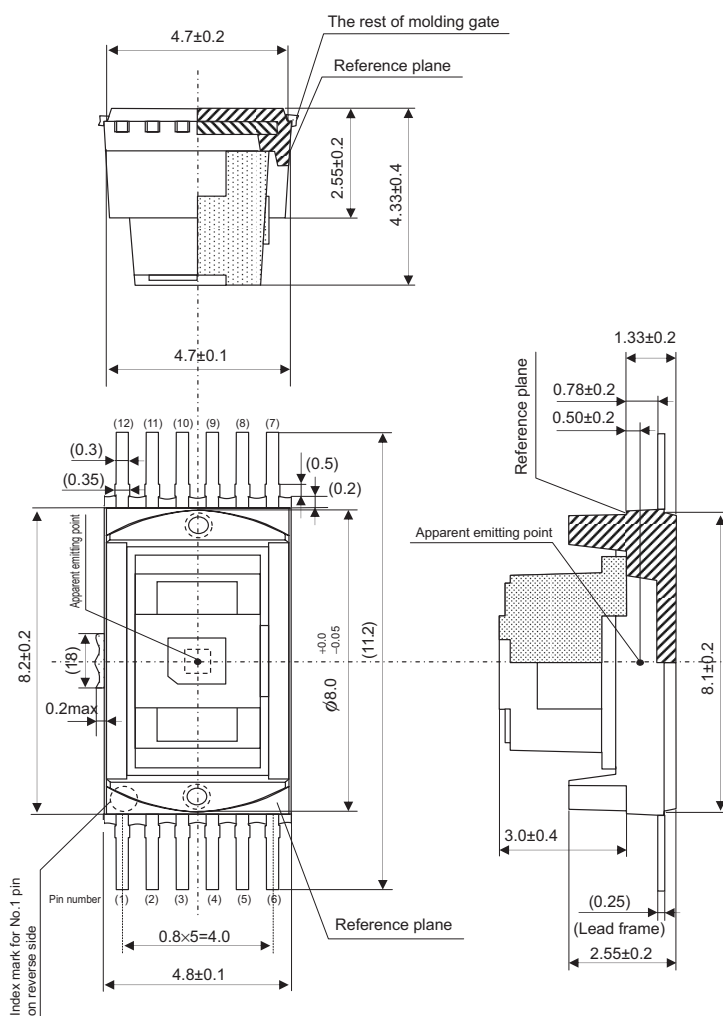


Part No.

- HUL7211
- HUL7212

Outline

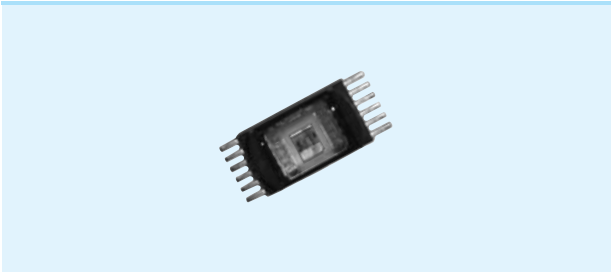
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Unit : mm

Package No.
PKG01-6

Appearance



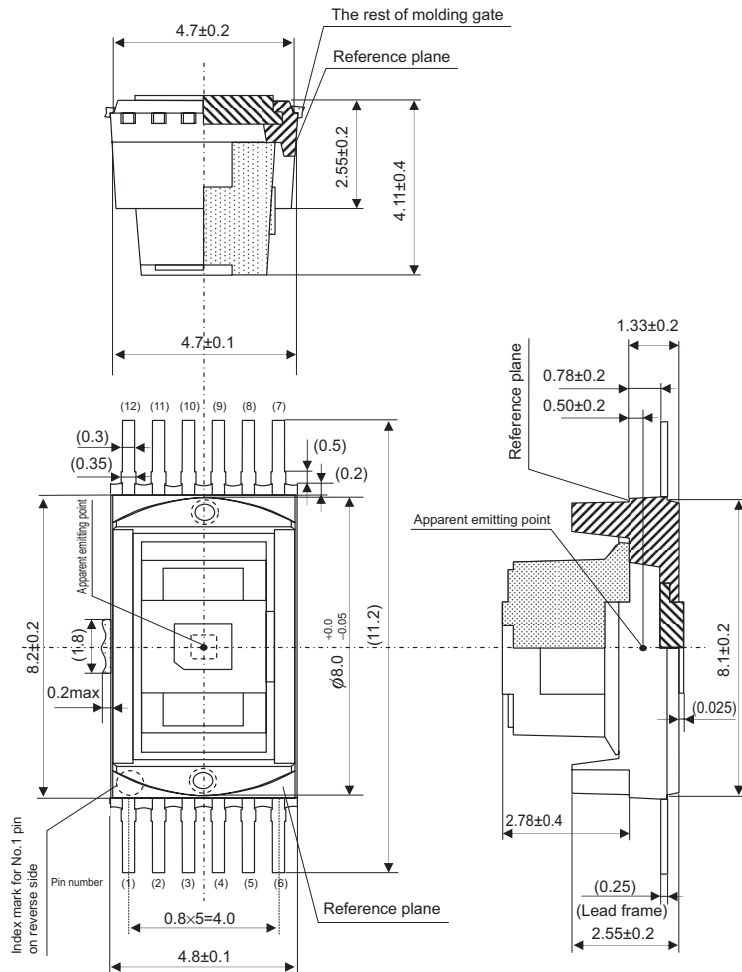
Part No.

● HUL7215

Outline

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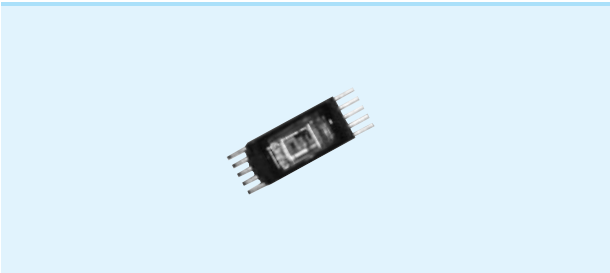
Unit : mm



Appearance and Outline

Package No. PKG03

Appearance



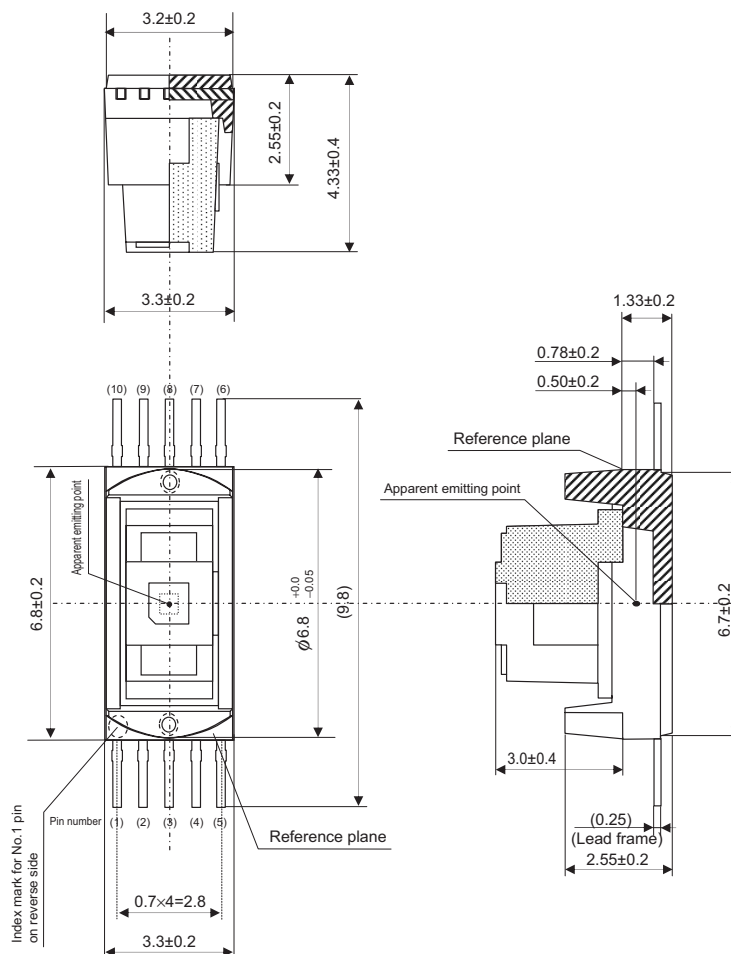
Part No.

● HUL7258

Outline

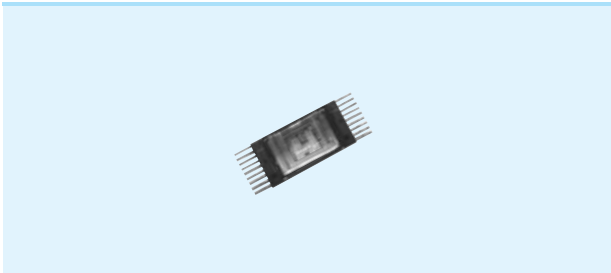
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Unit : mm



Package No.
PKG07

Appearance



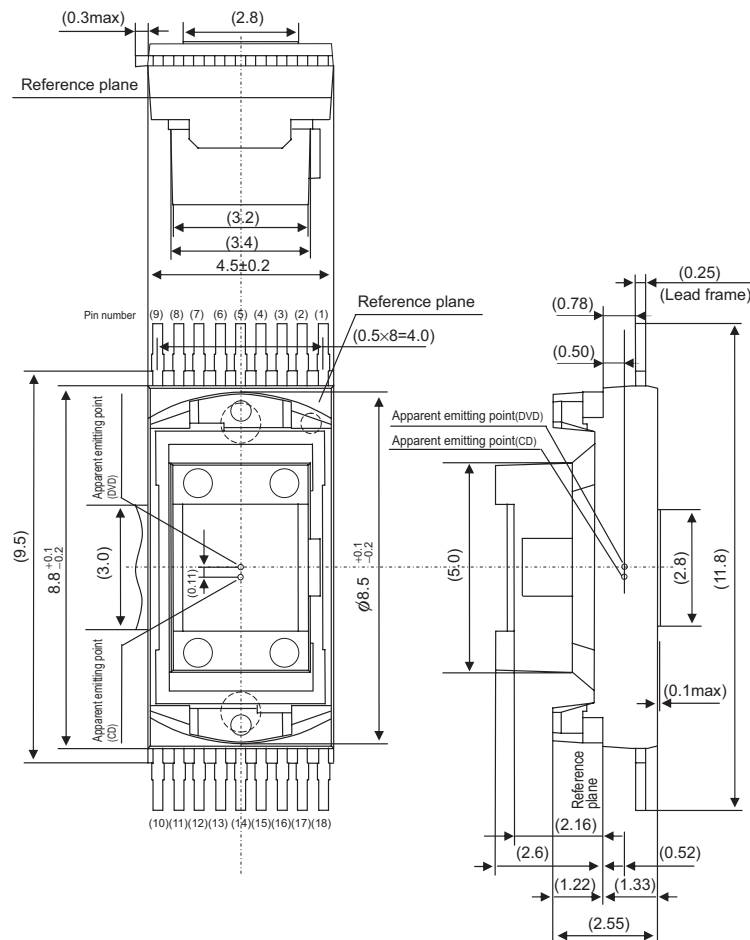
Part No.

- 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.

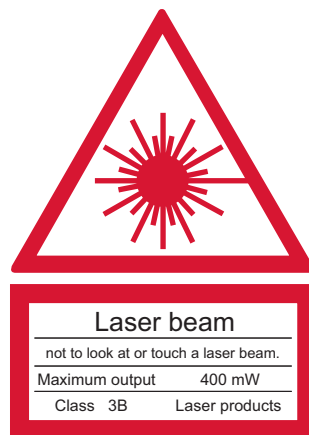
Unit : mm



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 M Ω), 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 \times 50 mm \times 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

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