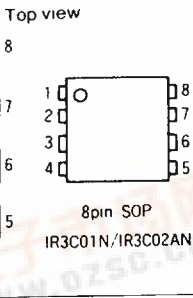# Driver IC

Laser Diodes Driver IC

Sharp manufactures a series of driver ICs (IR3C01/R3C01/R3C01N, IR3C02A/IR2C02AN) for use as laser diode APC circuits. Using these ICs, the power output of the laser is easily adjusted by means of an external resistance. Specifications are as follows:

IR3C01/IR3C01N, IR3C02A/IR3C02AN
Pin Assignment

Pin No.	IR3C01/IR3C01N symbol	Function	IR3C02A/IR3C02AN Symbol	Function
1	OUT	Out	OUT	Output
2	I_M	Monitor input	GND	Ground
3	V_{aj}	Output Setting	I_M	Monitor Input
4	V_{EE}	(−) Power Supply	V_{EE}	(−)Power Supply
5	V_{IN}	Control Input (on/off)	V_{IN}	Control Input (on/off)
6	GND	Ground	S_o	Operating signal output
7	C_p	Phase Compensation	C_p	Phase Compensation
8	V_{cc}	(+) Power Supply	V_{cc}	(+) Power Supply

Top view

8pin DIP
IR3C01/IR3C02A

8pin SOP
IR3C01N/IR3C02AN

Absolute Maximum Ratings
(Ta=25℃)

Parameter	Symbol	Remarks	Ratings IR3C01/IR3C01N	Ratings IR3C02A/IR3C02AN	Units
Supply Voltage	V_{cc}		13	10	V
Supply Voltage	V_{EE}		−20	−10	V
Output Current	I_o	Pin ①	170	−170	mA
Control Input Voltage	V_{IN}	Pin ⑤	−0.2 to 6	−0.2 to V_{cc}	V
Power Dissipation	P_c	Ta≤25℃	450/330	550/500	mW
Derating ratio	—	Ta>25℃	4.6/3.3	4.4	mW/℃
Operating Temperature	Topr		−20 to +85	−30 to +85	℃
Storage Temperature	Tstg		−55 to +150	−55 to +150	℃
Output Current	I_{os}	Pin ⑥ with laser on	—	5	mA
Output Applied Voltage	V_{os}	Pin ⑥ with laser off	—	−0.2~V_{cc}	V

Electrical Characteristics

(a) IR3C01/IR3C01N
(V_{cc}=−5V, V_{EE}=−12V, Ta=25℃)

Parameter	Symbol	Condition	MIN	TYP	MAX	Units
Operating Supply Voltage	V_{cc}	— —	4.5	5.0	5.5	V
	V_{EE}		−10.0	−12.0	−13.2	
Circut Current	I_{cc}	V_{IN}=0V	—	2.8	4.5	mA
	$I_{EE\ OFF}$	V_{IN}=0V	—	−1.3	−2.1	
	$I_{EE\ ON}$	V_{IN}=5V	—	−2.8	−4.6	
Output Voltage	V_{OUT}	I_O=150mA	3.6	4.1	—	V
		I_O=100mA	3.7	4.2	—	
		I_O=20mA	3.8	4.3	—	
Control Input Voltage (H)	V_{INH}		2.0	—	6	V
Control Input Voltage (L)	V_{INL}		0	—	0.8	V
Contol Input Current	I_{IN}	V_{IN}=5V	—	0.3	0.5	mA
Monitor Input pin Voltage	V_M		—	−6.9	—	V
Output Adjustment Pin Voltage	V_{aj}	(V_{aj}−V_{EE})	3.5	3.9	4.3	V
Power Supply Ripple Reduction	$\Delta I_O/\Delta V_{CC}$	f=120Hz	—	4×10^{-5}	—	A/V
	$\Delta I_O/\Delta V_{EE}$		—	1×10^{-6}	—	

(b) IR3C02A/IR3C02AN
(V_{cc}=5V, V_{EE}=−5V, Ta=25℃)

Parameter	Symbol	Condition	MIN	TYP	MAX	Units
Operating Supply Voltage	V_{cc}		4.5	5.0	5.5	V
	V_{EE}		−4.5	−5.0	−5.5	
Circuit Current	$I_{CC\ ON}$	V_{IN}=5V	—	2.8	5.0	mA
	$I_{EE\ ON}$		—	−2.0	−5.0	
	$I_{CC\ OFF}$	V_{IN}=0V	—	4.1	7.5	
	$I_{EE\ OFF}$		—	−2.1	−3.8	
Output Voltage	V_{OUT}	I_O=−150mA	3.7	4.1	—	V
		I_O=−100mA	3.8	4.2	—	
		I_O=−20mA	3.9	4.3	—	
Output Voltage	V_{OS1}	I_{os}=0mA, V_{IN}=0V	—	0.05	—	V
	V_{OS2}	I_{os}=2mA	—	—	0.4	
Control Input Voltage	H	V_{IN} H	V_O V_{os} L→H	1.43	1.53	1.63	V
	L	V_{IN} L	V_O V_{os}H→L	1.23	1.33	1.43	
	Hysteresis	V_{IN} HY	(V_{INH}−V_{INL})	—	200	—	mW
Control Input Current	I_{IN}		—	−0.3	—	μA
Monitor Input Pin Voltage	V		1.16	1.22	1.28	V
Monitor Input Pin Current	I		—	−0.3	−5	μA
Photo output power supply change	$\Delta I_P/\Delta V_{CC}$	V_{EE}=−5V, V_{CC}=5V±10%	—	0.02	—	%/V
	$\Delta I_P/\Delta V_{EE}$	V_{CC}=−5V, V_{EE}=−5V±10%	—	0.2	—	
Photo output changing width	$\Delta I_P/I_{PO}$	Ta=−30 to +85℃	—	0.2	—	%

Common Data

Fig. 94-1 Optical Power Output Dependence of Far-Field Pattern
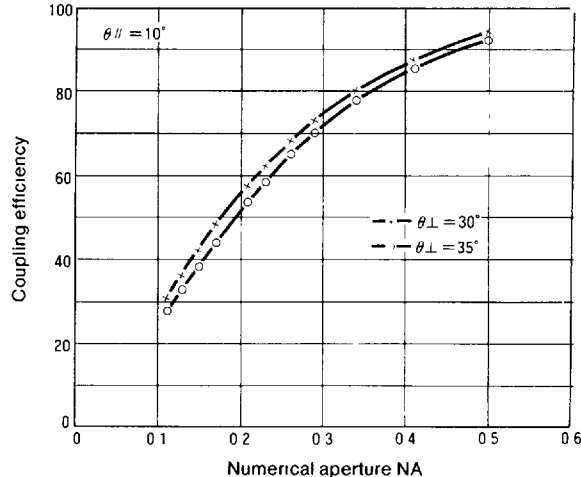
Relative optical power output vs. Radiation angle (deg)

Tc=25℃

Fig. 94-2 Polarization Ratio vs. Optical Power Output
(LT026 series, LT023 series)

Polarization ratio vs. Optical output power (mW)

NA=0 1
NA=0 25
NA=0 1
NA=0 25
LT026MD
LT023MC
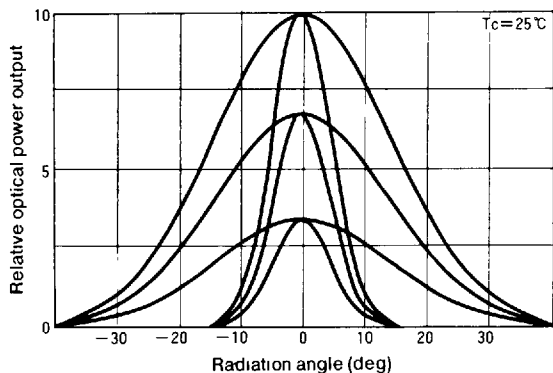
Fig. 94-4 Coupling Efficiency

Coupling efficiency vs. Numerical aperture NA

θ// =10°
--·-- θ⊥ =30°
--·-- θ⊥ =35°
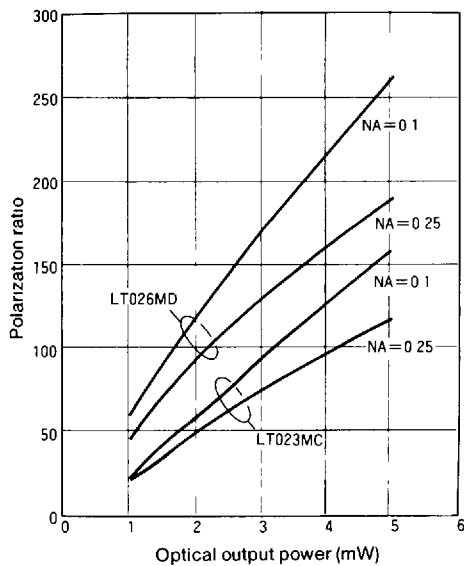
Fig. 94-5 Frequency Response

Relative output vs. Frequency (Hz)

0dB
−5dB
−10dB
−15dB

10M 100M 1G
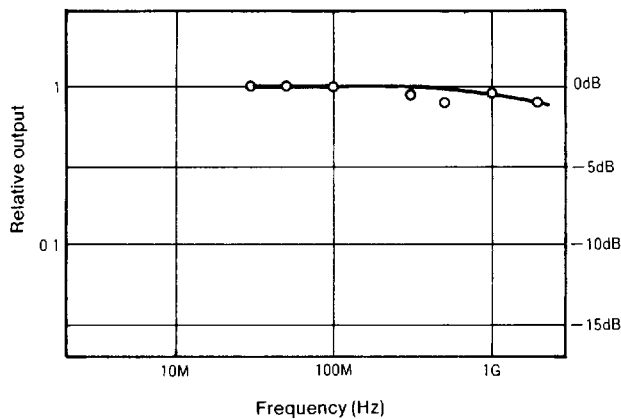
Fig. 94-3 Polarization Ratio vs. Optical Power Output (LT024 series, LT015 series)
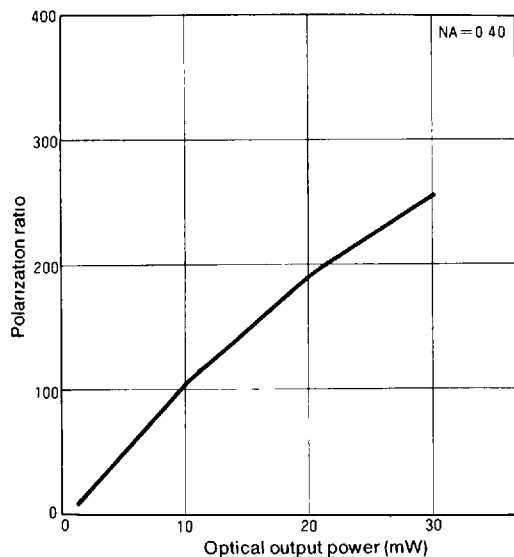
Polarization ratio vs. Optical output power (mW)

NA=0 40

Note All data on this page is typical only, and is not intended as a specification The shapes of these curves can be used as a general reference, but the actual characteristics will vary from device to device

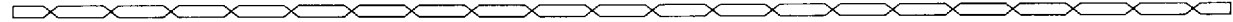# Built-in PIN Photodiode Characteristics

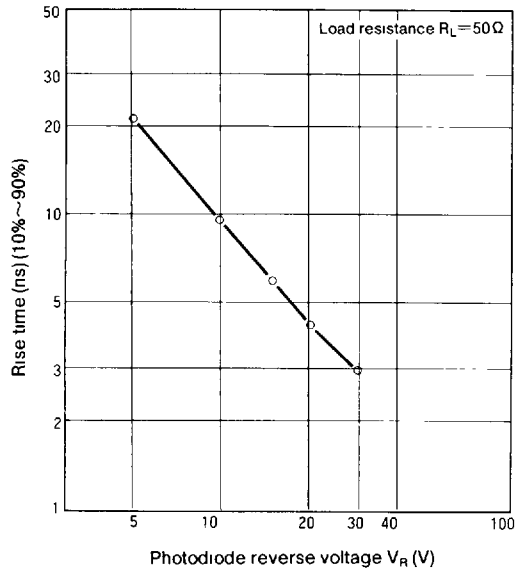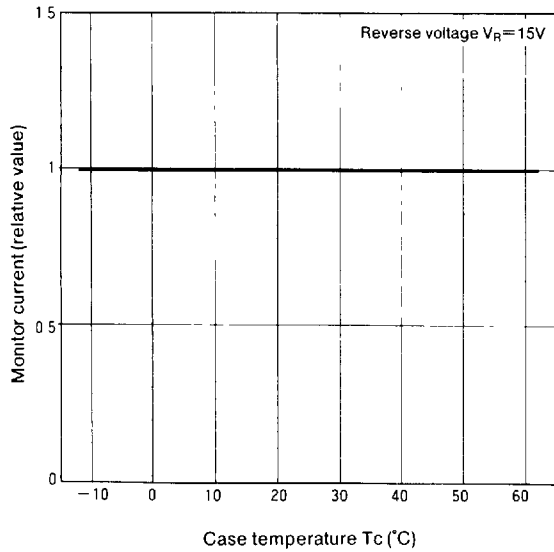## Fig. 95-1 Photodiode Frequecy Response Characteristic

Load resistance $R_L = 50\,\Omega$

Rise time (ns) (10%~90%)

Photodiode reverse voltage V_R (V)

Fig. 95-2 Photodiode Temperature Characteristic

Reverse voltage $V_R = 15V$

Monitor current (relative value)

Case temperature Tc (°C)

Note All data on this page is typical only, and is not intended as a specification The shapes of these curves can be used as a general reference, but the actual characteristics will vary from device to device
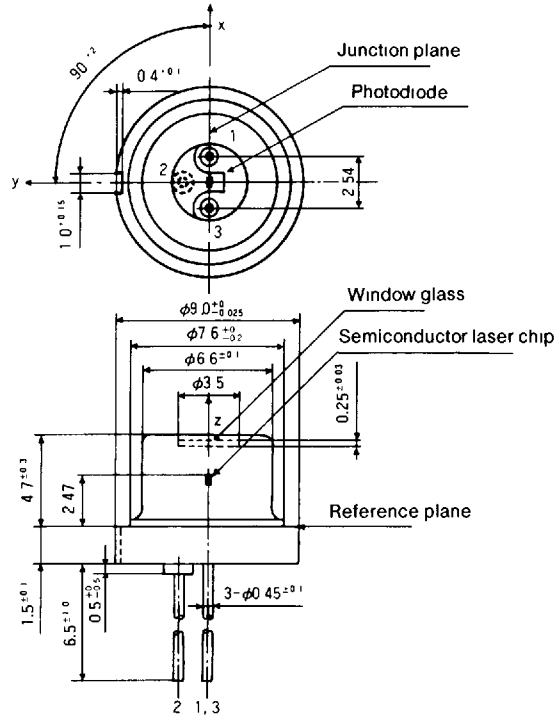
Outline Dimensions

Fig. 98-1 Standard Type (C Type)

Junction plane
Photodiode
Window glass
Semiconductor laser chip
Reference plane

Fig. 98-2 Low-Cap Type (D Type)

Junction plane
Photodiode
Window glass
Semiconductor laser chip
Reference plane
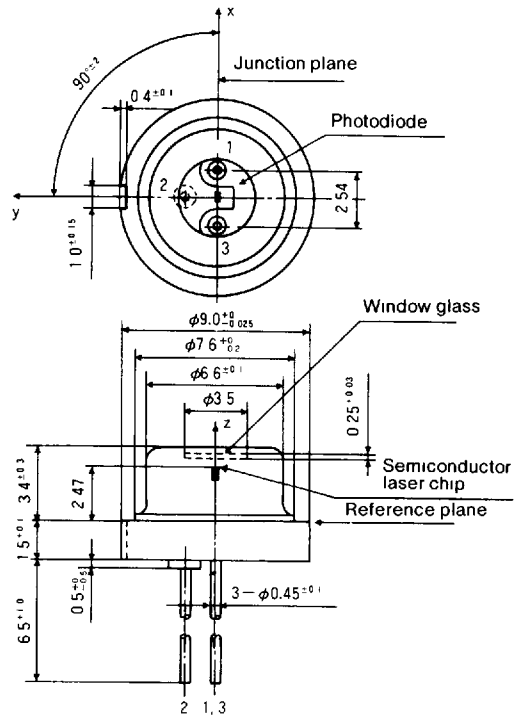
Fig. 98-3 Fin-Equipped Type (F Type)

Heat sink
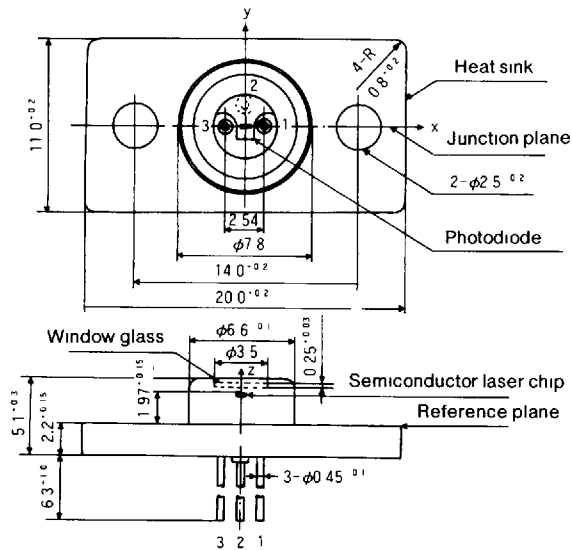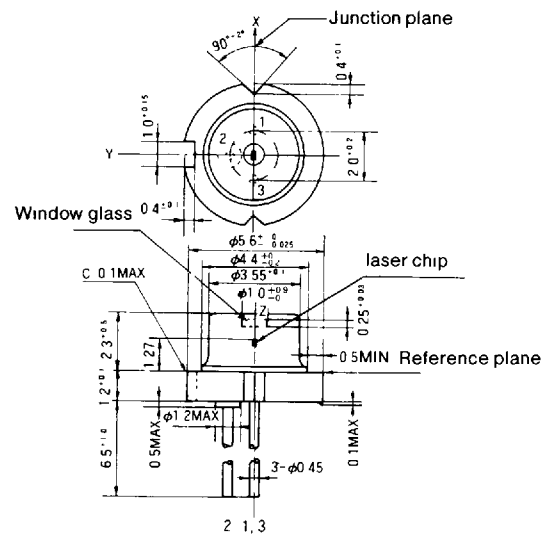Junction plane
Photodiode
Window glass
Semiconductor laser chip
Reference plane

Fig. 98-4 Compact Package Type (S Type)

Junction plane
Window glass
laser chip
Reference plane

Terminal connections

laser — Photodiode
laser — Photodiode

Dual power supply
(M H A)

Single power supply
(P, W, E, G)