

GP1F31T/R, GP1F32T/R, GP1F33TT/RR/RT, GP1C331/331A/332/333/334/335

■ Features

1. Low jitter (Δt_j : TYP. 1ns)
 2. High speed signal transmission
(8Mbps, NRZ signal)
 3. Directly connectable to modulation
/demodulation IC for digital audio equipment
 - Fiber optic transmitter ... Built-in light emitting diode driving circuit
 - Fiber optic receiver ... Built-in signal processing circuit
 4. With two fixing holes for easy mounting on set panel
(**GP1F32T/GP1F32R/GP1F33RR/
GP1F33TT/33RT**)
 5. 2-channel type
(**GP1F33RR/GP1F33TT/GP1F33RT**)
- * Sharp's optical fiber cables,
(**GP1C331, GP1C331A, GP1C332, GP1C333,
GP1C334, GP1C335**) are recommended

The model marked with ▲ may not be available in the near future. Contact Sharp sales personnel for details before use

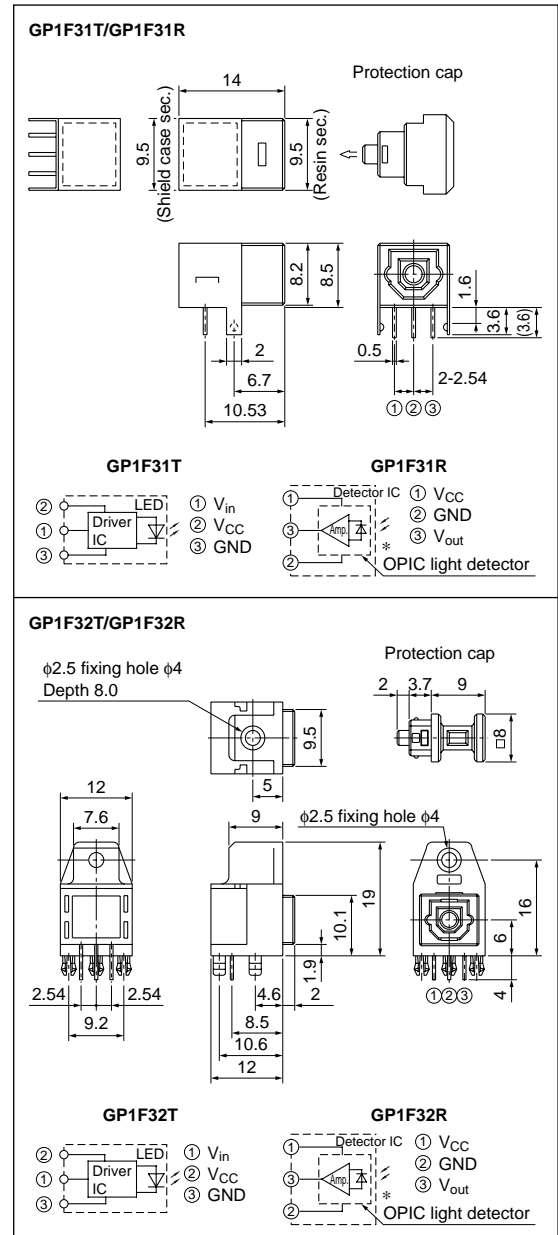
■ Applications

1. CD players
2. BS tuners
3. Digital amplifiers

Fiber Optic Transmitting /Receiving Units

■ Outline Dimensions

(Unit : mm)



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

Model Line-ups

Model No.	Internal Constitution
GP1F31T	Fiber optic transmitter
GP1F31R	Fiber optic receiver
GP1F32T	Fiber optic transmitter
GP1F32R	Fiber optic receiver
GP1F33TT	Fiber optic transmitter (2-channel)
GP1F33RR	Fiber optic receiver (2-channel)
GP1F33RT	Fiber optic transmitter/receiver
GP1C331	Fiber optic cable (1m)
GP1C331A	Fiber optic cable (0.6m)
GP1C332	Fiber optic cable (2m)
GP1C333	Fiber optic cable (3m)
GP1C334	Fiber optic cable (4m)
GP1C335	Fiber optic cable (5m)

Absolute Maximum Ratings (Ta=25°C)

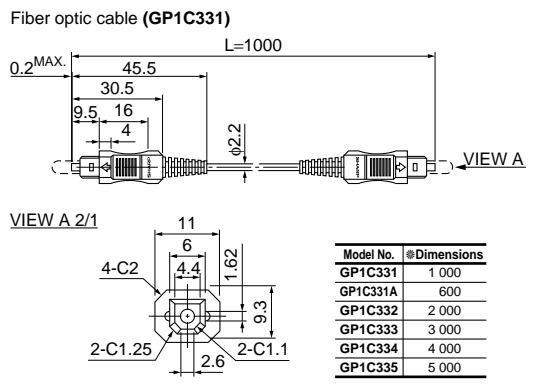
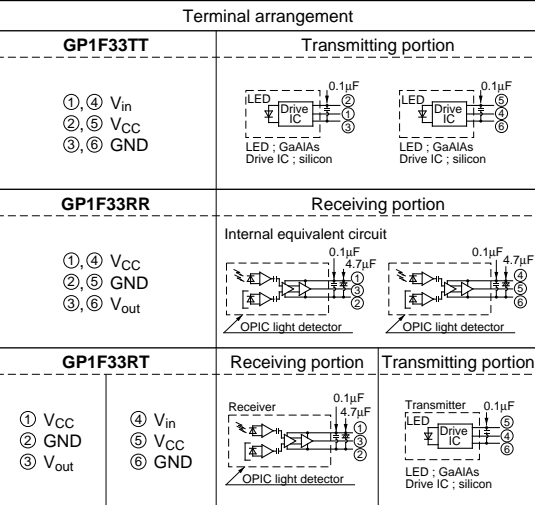
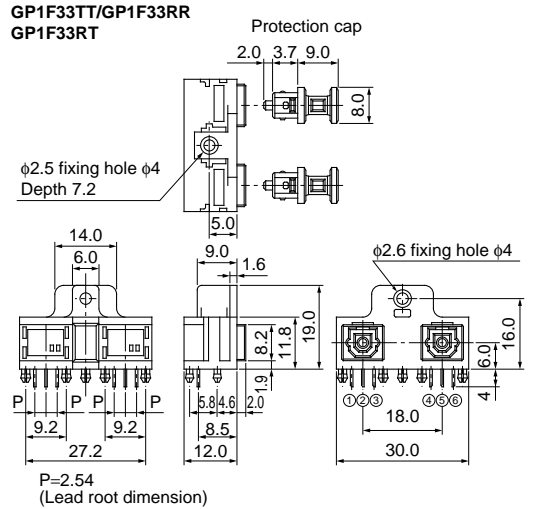
Parameter	Symbol	Rating	Unit
Supply voltage	V _{cc}	-0.5 to +7	V
Input voltage	*4 V _{in}	-0.5 to V _{cc} +0.5	V
Power dissipation	*4 P	125	mW
*1 High level output current	*5 I _{OH}	4	mA
*2 Low level output current	*5 I _{OL}	4	mA
Operating temperature	*6 T _{opr}	-10 to +60	°C
		-20 to +70	°C
Storage temperature	T _{stg}	-30 to +80	°C
*3 Soldering temperature	T _{sol}	260	°C

- *1 Source current
- *2 Sink current
- *3 5 seconds/2 times or less
- *4 GP1F31T/GP1F32T/GP1F33TT/Transmitting portion of GP1F33RT
- *5 GP1F31R/GP1F32R/GP1F33RR/Receiving portion of GP1F33RT
- *6 GP1F31T/GP1F31R
- *7 GP1F32T/GP1F32R/GP1F33TT, GP1F33RR, GP1F33RT

Fiber Optic Cable
(GP1C331, GP1C331A, GP1C332, GP1C333, GP1C334, GP1C335) (Ta=25°C)

Parameter	Symbol	Rating	Unit
Tension	Plug & optical fiber	T _{pf}	40 N
	Optical fiber	T _f	40 N
Bending radius	R	MIN. 25	mm
Operating temperature	T _{opr}	-30 to +70	°C
Storage temperature	T _{stg}	-30 to +70	°C

Outline Dimensions



■ Electro-optical Characteristics(1) Transmitter

GP1F31T/GP1F32T/GP1F33TT/Transmitting portion of GP1F33RT

(Ta=25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Operating voltage	V _{CC}	–	4.75	5.00	5.25	V
Peak emission wavelength	λ _p	–	630	660	690	nm
Optical power output coupling with fiber	P _c	Refer to Fig.1	–21	–17	–15	dBm
Dissipation current	I _{CC}	Refer to Fig.2	–	4	10	mA
High level input voltage	V _{IH}	Refer to Fig.2	2	–	–	V
Low level input voltage	V _{IL}	Refer to Fig.2	–	–	0.8	V
Low → High propagation delay time	t _{pLH}	Refer to Fig.3	–	–	100	ns
High → Low propagation delay time	t _{pHL}	Refer to Fig.3	–	–	100	ns
Pulse width distortion	Δtw	Refer to Fig.3	–25(–30)**	–	+25(+30)**	ns
Jitter	Δt _j	Refer to Fig.4	–	1	25(30)**	ns
Operating transfer rate	T	–	–	–	8	Mbps

** Value in parenthesis : GP1F31T

■ Electro-optical Characteristics(2) Receiver

GP1F31R/GP1F32R/GP1F33RR/Receiving portion of GP1F33RT

(Ta=25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Operating voltage	V _{CC}	–	4.75	5.00	5.25	V
Peak sensitivity wavelength	λ _p	–	–	700	–	nm
Maximum input optical power level for receiving unit	P _C MAX	Refer to Fig.5	–14.5	–	–	dBm
Minimum input optical power level for receiving unit	P _C MIN	Refer to Fig.5	–	–	–24	dBm
Dissipation current	I _{CC}	Refer to Fig.6	–	15	40	mA
High level output voltage	V _{OH}	Refer to Fig.7	2.7	3.5	–	V
Low level output voltage	V _{OL}	Refer to Fig.7	–	0.2	0.4	V
Rise time	t _r	Refer to Fig.7	–	12	30	ns
Fall time	t _f	Refer to Fig.7	–	4	30	ns
Low → High propagation delay time	t _{pLH}	Refer to Fig.7	–	–	100	ns
High → Low propagation delay time	t _{pHL}	Refer to Fig.7	–	–	100	ns
Pulse width distortion	Δtw	Refer to Fig.7	–30	–	+30	ns
Jitter	Δt _j	Refer to Fig.8, P _c =–15dBm	–	1	30	ns
		Refer to Fig.8, P _c =–24dBm	–	–	30	ns
Operating transfer rate	T	NRZ. duty 50% input	0.1	–	8	Mbps

■ Electro-optical Characteristics(3) Fiber Optic Cable

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Optical output coupling fiber	P _c	–17	–	–	dBm
Refracting ratio distribution	–	Step index			–

■ Mechanical Characteristics

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Insertion force, withdrawal force	—	In compliance with EIAJ RC-5720 Initial value when a square connector in used.	6	—	40	N

Fig.1 Measuring Method of Optical Output Coupling With Fiber

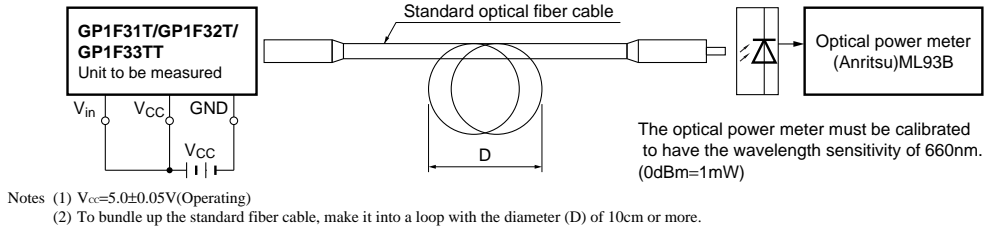
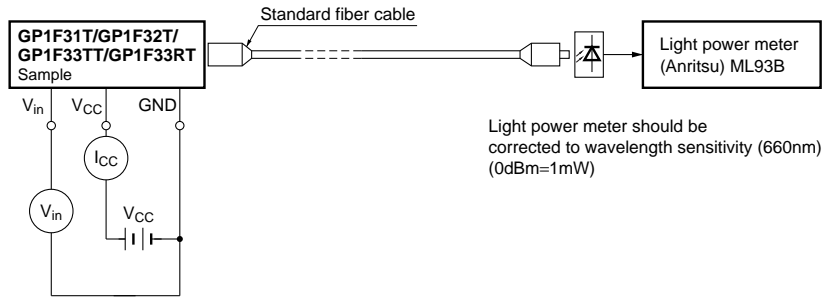


Fig.2 Input Voltage/Power Dissipation Measuring method



Input condition and measuring method

Input condition	Measuring method
$V_{in}=2.0V$ or more	$-21 \leq P_c \leq -15dBm$, $I_{cc}=10mA$ or less
$V_{in}=0.8V$ or less	$P_c \leq -36dBm$, $I_{cc}=10mA$ or less

Note (1) $V_{CC}=5.0\pm 0.05V$ (ON-State)

Fig.3 Pulse Response Measuring Method

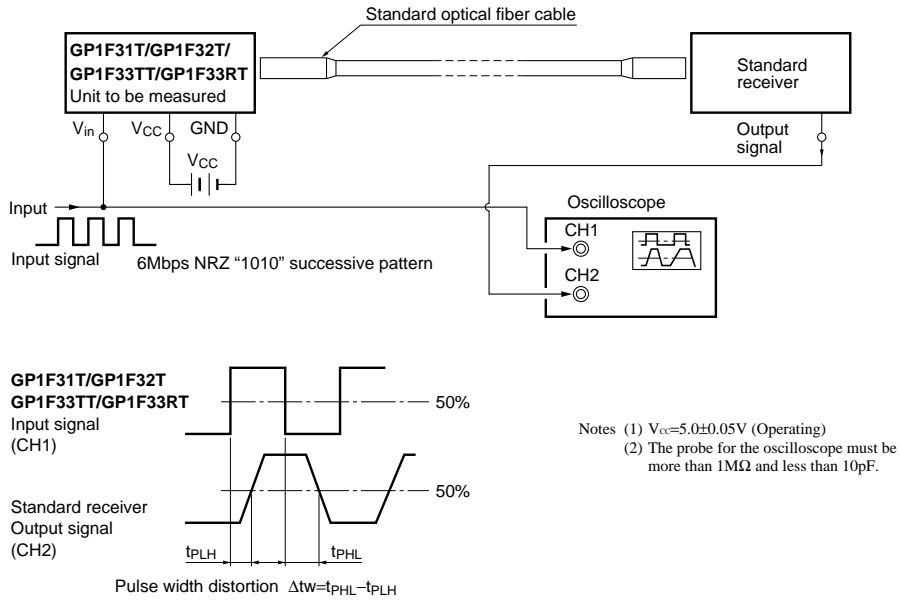


Fig.4 Measuring Method of Jitter

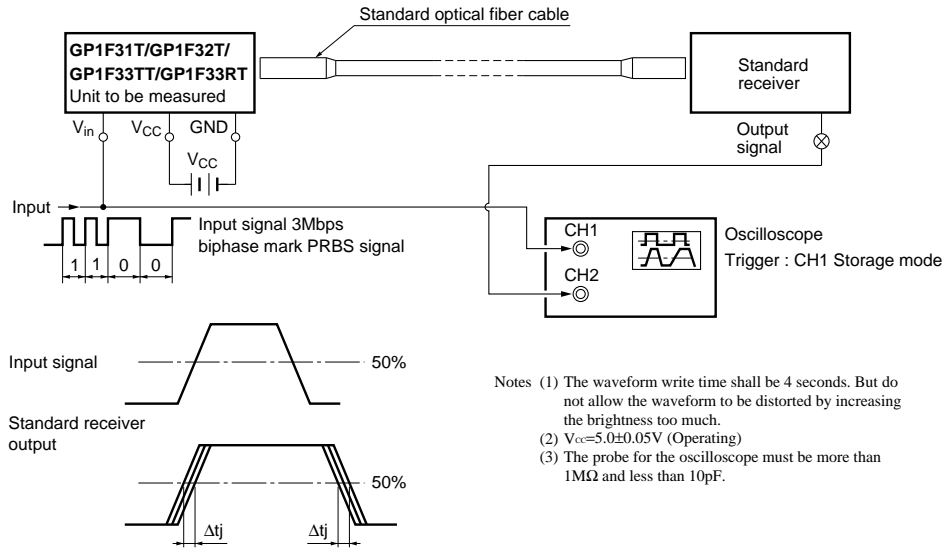
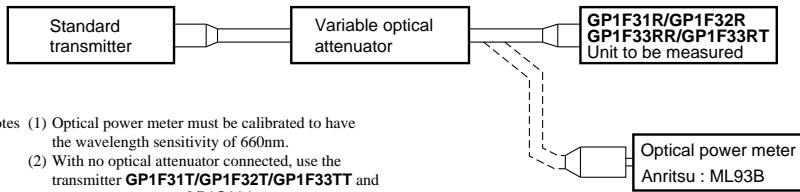


Fig.5 Maximum Input Optical Power Level/Minimum Input Optical Power Level Measuring Method of Receiving Unit



- Notes (1) Optical power meter must be calibrated to have the wavelength sensitivity of 660nm.
 (2) With no optical attenuator connected, use the transmitter **GP1F31T/GP1F32T/GP1F33TT** and the fiber optic cable **GP1C331** with the fiber coupling light output set at $-15\text{dBm}/-24\text{dBm}$.

Fig.6 Measuring Method of Dissipation Current

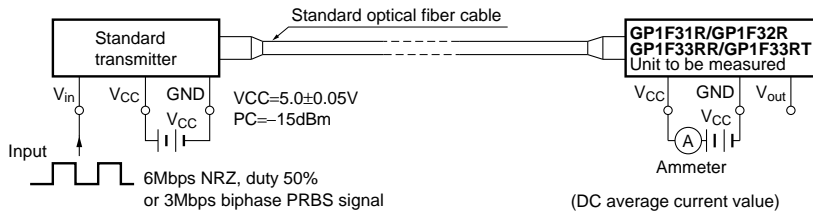
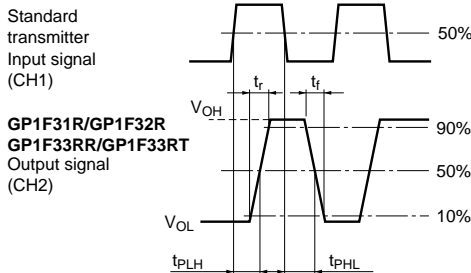
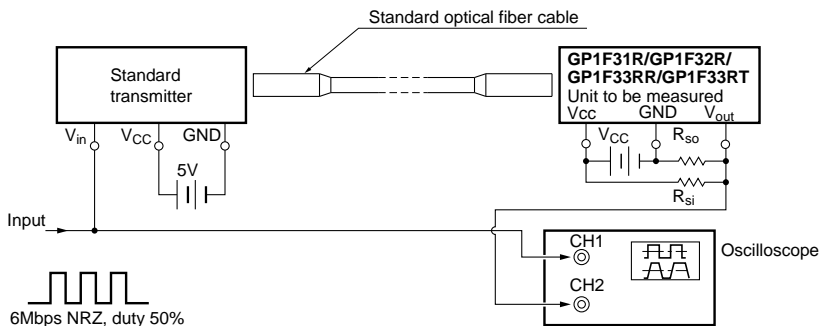


Fig.7 Measuring Method of Output Voltage and Pulse



- Notes (1) $V_{CC} : 5.0 \pm 0.05\text{V}$ (Operating)
 (2) The probe for the oscilloscope must be more than $1\text{M}\Omega$ and less than 10pF .
 (3) R_{si} , R_{so} ; Standard load resistance
 ($R_{si} : 3.3\text{k}\Omega$, $R_{so} : 2.2\text{k}\Omega$)

Fig.8 Measuring Method of Jitter

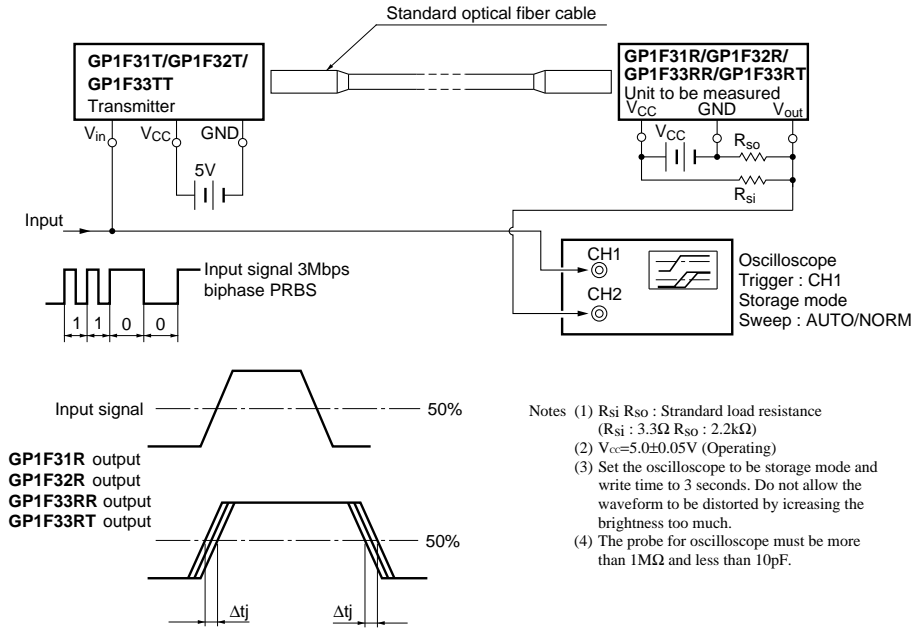
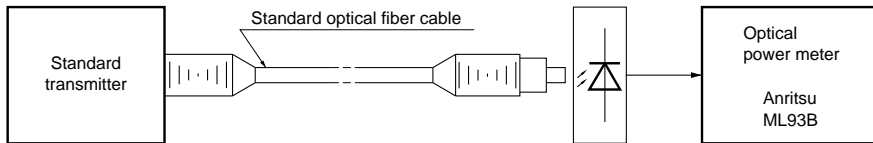
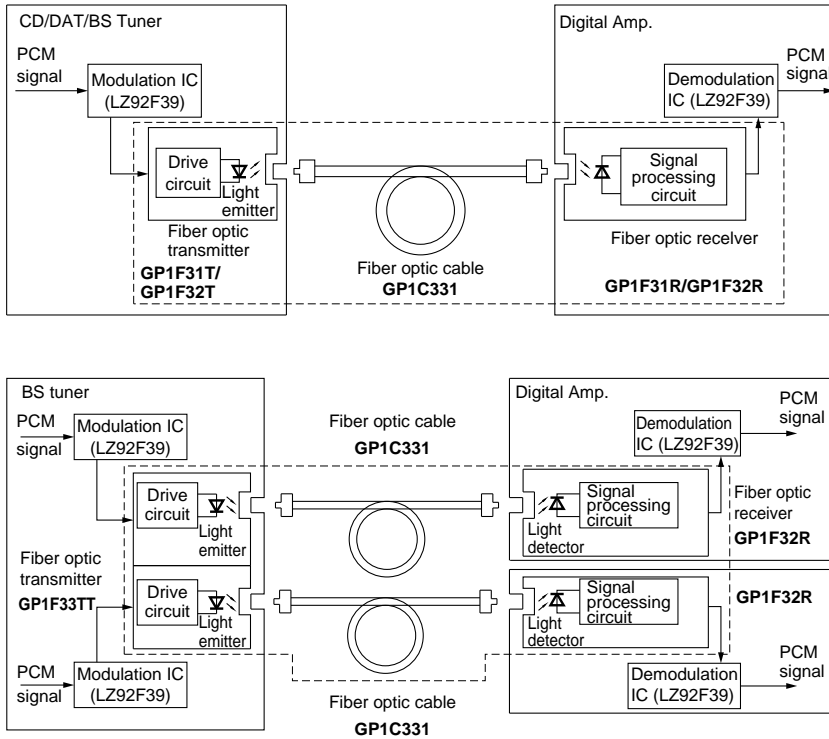


Fig.9 Measuring Method of Optical Output Coupling With Fiber



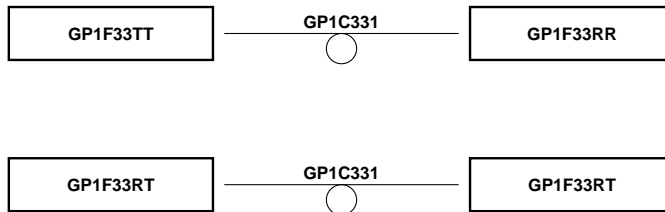
Standard light transmitter : Light transmitter that provides the fiber-end optical output of $-15dBm \pm 0.3dBm$ when the standard fiber optic cable is connected.

Fig.10 System Configuration Example



*LZ92F39 is Sharp's modulation/demodulation IC.

In addition, you can also choose the following system configuration according to your application.



■ Precautions for Use

Please refer to the chapter "Precautions for Use"

NOTICE

- The circuit application examples in this publication are provided to explain representative applications of SHARP devices and are not intended to guarantee any circuit design or license any intellectual property rights. SHARP takes no responsibility for any problems related to any intellectual property right of a third party resulting from the use of SHARP's devices.
- Contact SHARP in order to obtain the latest device specification sheets before using any SHARP device. SHARP reserves the right to make changes in the specifications, characteristics, data, materials, structure, and other contents described herein at any time without notice in order to improve design or reliability. Manufacturing locations are also subject to change without notice.
- Observe the following points when using any devices in this publication. SHARP takes no responsibility for damage caused by improper use of the devices which does not meet the conditions and absolute maximum ratings to be used specified in the relevant specification sheet nor meet the following conditions:
 - (i) The devices in this publication are designed for use in general electronic equipment designs such as:
 - Personal computers
 - Office automation equipment
 - Telecommunication equipment [terminal]
 - Test and measurement equipment
 - Industrial control
 - Audio visual equipment
 - Consumer electronics
 - (ii) Measures such as fail-safe function and redundant design should be taken to ensure reliability and safety when SHARP devices are used for or in connection with equipment that requires higher reliability such as:
 - Transportation control and safety equipment (i.e., aircraft, trains, automobiles, etc.)
 - Traffic signals
 - Gas leakage sensor breakers
 - Alarm equipment
 - Various safety devices, etc.
 - (iii) SHARP devices shall not be used for or in connection with equipment that requires an extremely high level of reliability and safety such as:
 - Space applications
 - Telecommunication equipment [trunk lines]
 - Nuclear power control equipment
 - Medical and other life support equipment (e.g., scuba).
- Contact a SHARP representative in advance when intending to use SHARP devices for any "specific" applications other than those recommended by SHARP or when it is unclear which category mentioned above controls the intended use.
- If the SHARP devices listed in this publication fall within the scope of strategic products described in the Foreign Exchange and Foreign Trade Control Law of Japan, it is necessary to obtain approval to export such SHARP devices.
- This publication is the proprietary product of SHARP and is copyrighted, with all rights reserved. Under the copyright laws, no part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, in whole or in part, without the express written permission of SHARP. Express written permission is also required before any use of this publication may be made by a third party.
- Contact and consult with a SHARP representative if there are any questions about the contents of this publication.