

GP1FA501TZ/ GP1FA501RZ

■ Features

1. Shutter system unnecessary to remove the protection cap
2. Uni-directional data transmission using plastic optical fiber cable
3. The optical receiver can be directly connectable the TTL, due to the use of OPIC

■ Applications

1. DVD players
2. CD players
3. MD players

■ Absolute Maximum Ratings (T_a=25°C)

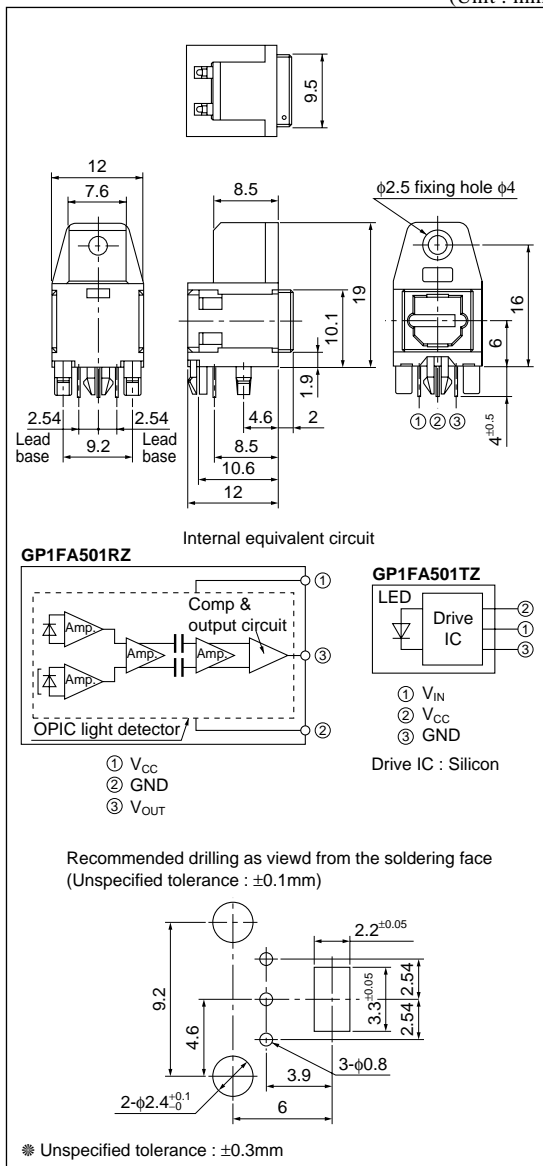
Parameter	Symbol	Rating	Unit
Supply voltage	V _{CC}	-0.5 to +7.0	V
Output current (GP1FA501RZ)	I _{OH}	4 (Source current)	mA
	I _{OL}	4 (Sink current)	
Input voltage (GP1FA501TZ)	V _{IN}	-0.5 to V _{CC} +0.5	V
Operating temperature	T _{opr}	-20 to +70	°C
Storage temperature	T _{stg}	-30 to +80	°C
*1 Soldering temperature	T _{sol}	260	°C

*1 For 5s (2 times or less)

Shutter System Fiber Optic Transmitter/ Receiver

■ 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 single chip.

■ Recommended Operating Conditions (GP1FA501TZ) (T_a=25°C)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Operating supply voltage	V _{CC}	4.75	5.0	5.25	V
*2 Operating transfer rate	T	–	–	8	Mb/s

*2 NRZ signal duty 50%

■ Recommended Operating Conditions (GP1FA501RZ) (T_a=25°C)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Operating supply voltage	V _{CC}	4.75	5.0	5.25	V
*3*4 Operating transfer rate	T	0.1	–	8	Mb/s
*5 Input optical power level	P _C	–24	–	–14.5	dBm

*3 The above operating transfer rate is the value when NRZ signal, "0101..." continuous signal of duty 50% is transmitted

*4 The output (H/L level) of GP1FA501RZ are not fixed constantly when it receives the modulating light (including DC light, no input light) less than 0.1Mb/s

*5 Peak optical output

■ Electro-optical Characteristics (GP1FA501TZ) (T_a=25°C, V_{CC}=5V)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
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 delay time	t _{pLH}	Refer to Fig.3	–	–	100	ns
High→Low delay time	t _{pHL}	Refer to Fig.3	–	–	100	ns
Pulse width distortion	Δt _w	Refer to Fig.3	–25	–	+25	ns
Jitter	Δt _j	Refer to Fig.3	–	1	25	ns

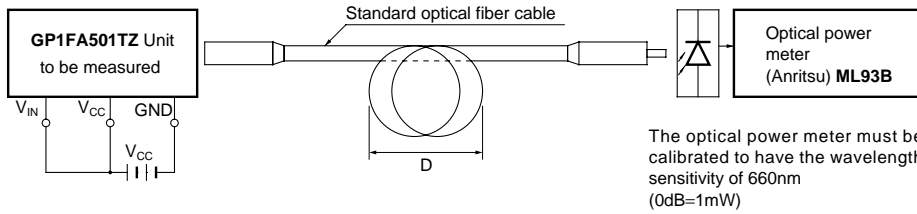
■ Electro-optical Characteristics (GP1FA501RZ) (T_a=25°C, V_{CC}=5V)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Peak sensitivity wavelength	λ _p	–	–	700	–	nm
Dissipation current	I _{CC}	Refer to Fig.4	–	15	40	mA
High level output voltage	V _{OH}	Refer to Fig.5	2.7	3.5	–	V
Low level output voltage	V _{OL}	Refer to Fig.5	–	0.2	0.4	V
Rise time	t _r	Refer to Fig.5	–	12	30	ns
Fall time	t _f	Refer to Fig.5	–	4	30	ns
Low→High delay time	t _{pLH}	Refer to Fig.5	–	–	100	ns
High→Low delay time	t _{pHL}	Refer to Fig.5	–	–	100	ns
Pulse width distortion	Δt _w	Refer to Fig.5	–30	–	+30	ns
Jitter	Δt _j	Refer to Fig.6, P _C =–14.5dBm	–	1	30	ns
		Refer to Fig.6, P _C =–24dBm	–	–	30	ns

■ Mechanical Characteristics

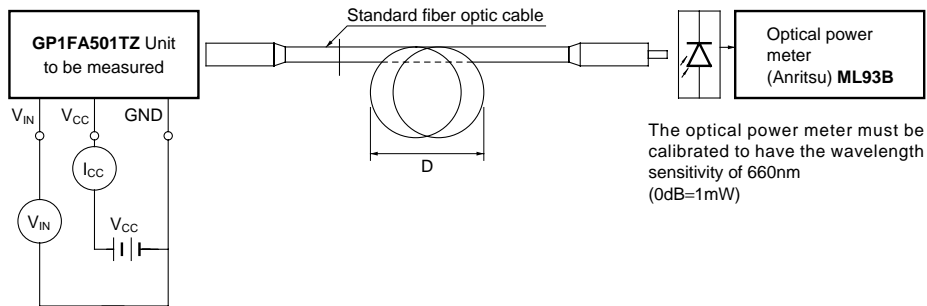
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Insertion force, withdrawal force	–	Initial value when a GP1C331 is used.	6	–	40	N

Fig.1 Measuring Method of Optical Output Coupling with Fiber



- Note (1) V_{CC} : 5.0V (State of operating)
 (2) To bundle up the standard fiber optic cable, make it into a loop with the diameter $D=10$ cm or more (The standard fiber optic cable will be specified elsewhere.)

Fig.2 Measuring Method of Input Voltage and Supply Current

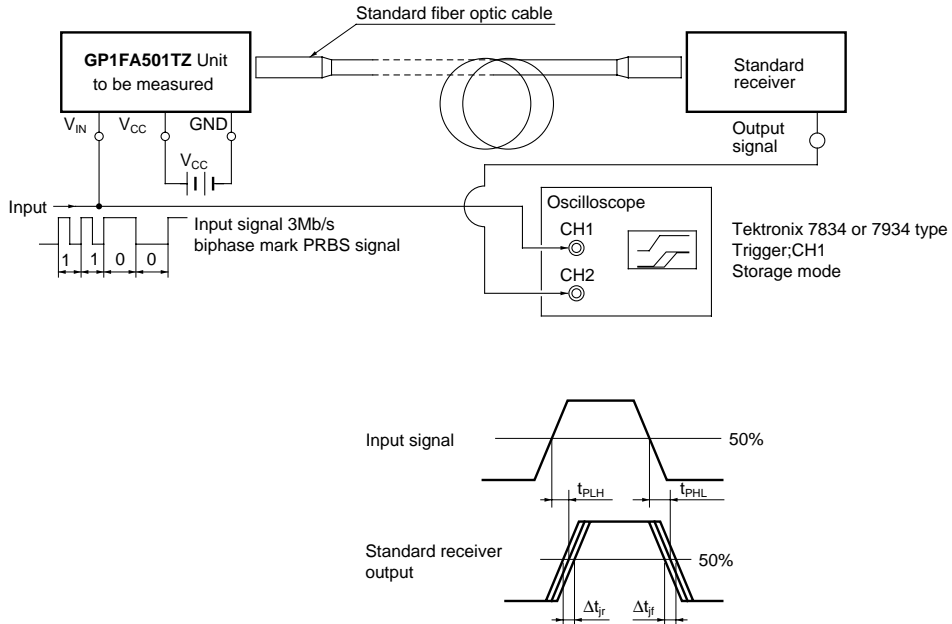


Input conditions and judgement method

Conditions	Judgement 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 $V_{CC}=5.0V$ (State of operating)

Fig.3 Measuring Method of Pulse Response and Jitter



Parameter	Symbol	Conditions
Low→High delay time	t_{pLH}	Refer to the above mentioned prescription
High→Low delay time	t_{pHL}	Refer to the above mentioned prescription
Pulse width distortion	Δt_w	$\Delta t_w = t_{pHL} - t_{pLH}$
Low→High jitter	Δt_{jr}	Set the trigger on the rise of input signal to measure the jitter of the rise of output
High→Low jitter	Δt_{jl}	Set the trigger on the fall of input signal to measure the jitter of the fall of output

- Notes (1) The waveform write time shall be 4s. But do not allow the waveform to be distorted by increasing the brightness too much
 (2) $V_{CC}=5.0V$ (State of operating)
 (3) The probe for the oscilloscope must be more than $1M\Omega$ and less than $10pF$

Fig.4 Supply Current

Input conditions	Measuring method
Supply voltage	Measured on an ammeter (DC average amperage)
Fiber coupling light output	
Standard transmitter input signal	

$V_{CC}=5.0V$

$P_C=-14.5dBm$

6Mb/s NRZ, Duty 50% or 3Mb/s biphasic mark PRBS signal

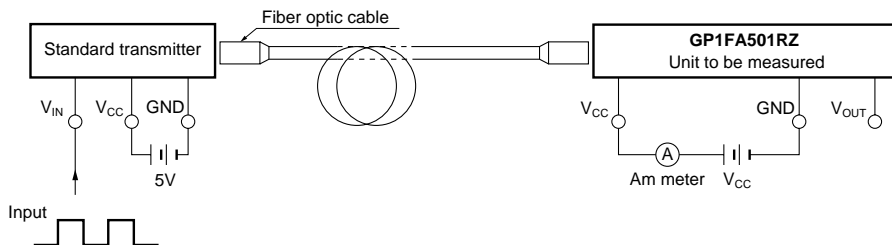
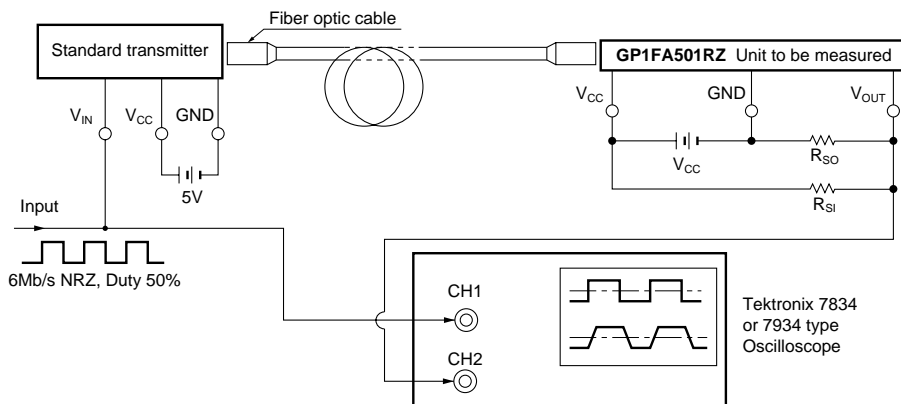


Fig.5 Measuring Method of Output Voltage and Pulse Response



Test item

Test item	Symbol
Low → High pulse delay time	t_{pLH}
High → Low pulse delay time	t_{pHL}
Rise time	t_r
Fall time	t_f
Pulse width distortion $\Delta t_w = t_{pHL} - t_{pLH}$	Δt_w
High level output voltage	V_{OH}
Low level output voltage	V_{OL}

- Notes (1) $V_{CC}=5.0V$ (State of operating)
 (2) The fiber coupling light output set at $-14.5dBm/-24dBm$
 (3) The probe for the oscilloscope must be more than $1M\Omega$ and less than $10pF$
 (4) R_{SI} , R_{SO} :Standard load resistance ($R_{SI}:3.3k\Omega$, $R_{SO}:2.2k\Omega$)
 (5) The output (H/L level) of **GP1FA501RZ** are not fixed constantly when it receives the modulating light (including DC light, no input light) less than $0.1Mb/s$

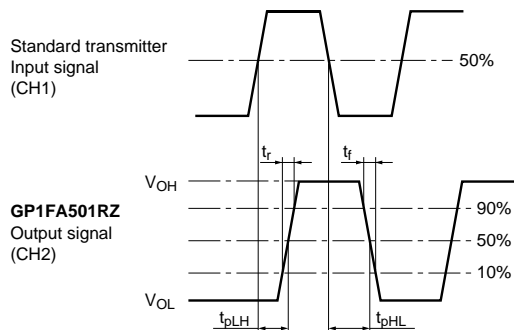
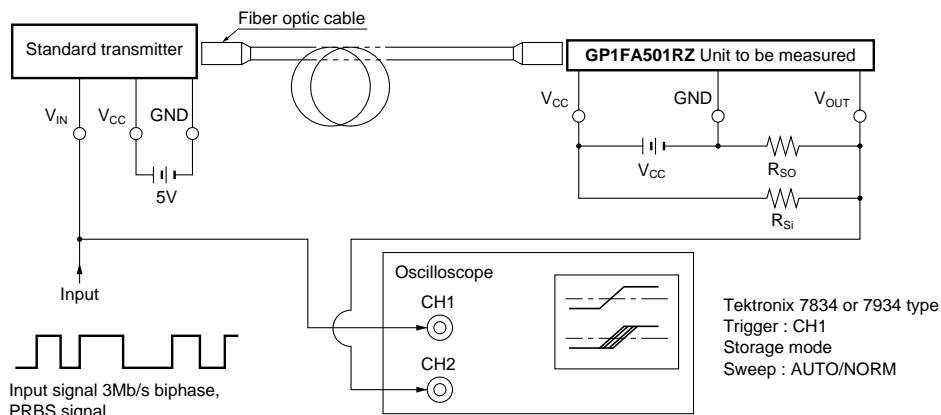


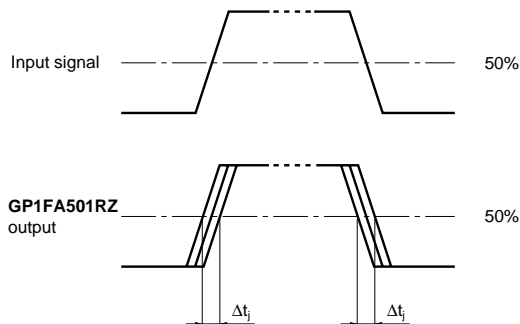
Fig.6 Measuring Method of Jitter



Test item

Test item	Symbol	Test condition
Jitter	Δt_j	Set the trigger on the rise of input signal to measure the jitter of the rise of output
Jitter	Δt_j	Set the trigger on the fall of input signal to measure the jitter of the fall of output

- Notes
- (1) The fiber coupling light output set at $-14.5\text{dBm}/-24\text{dBm}$
 - (2) R_{Si} , R_{So} : Standard load resistance (R_{Si} : $3.3\text{k}\Omega$, R_{So} : $2.2\text{k}\Omega$)
 - (3) The waveform write time shall be 3s. But do not allow the waveform to be distorted by increasing the brightness too much
 - (4) $V_{CC}=5.0\text{V}$ (State of operating)
 - (5) The probe for the oscilloscope must be more than $1\text{M}\Omega$ and less than 10pF



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