GP1FA550TZ/ GP1FA550RZ

Fiber Optic Transmitter/Receiver

■ Features

1. Uni-diretional signal transmission for plastic optical fiber cables
2. The optical receiver can be directly connectable the TTL, due to the use of OPIC

■ Applications

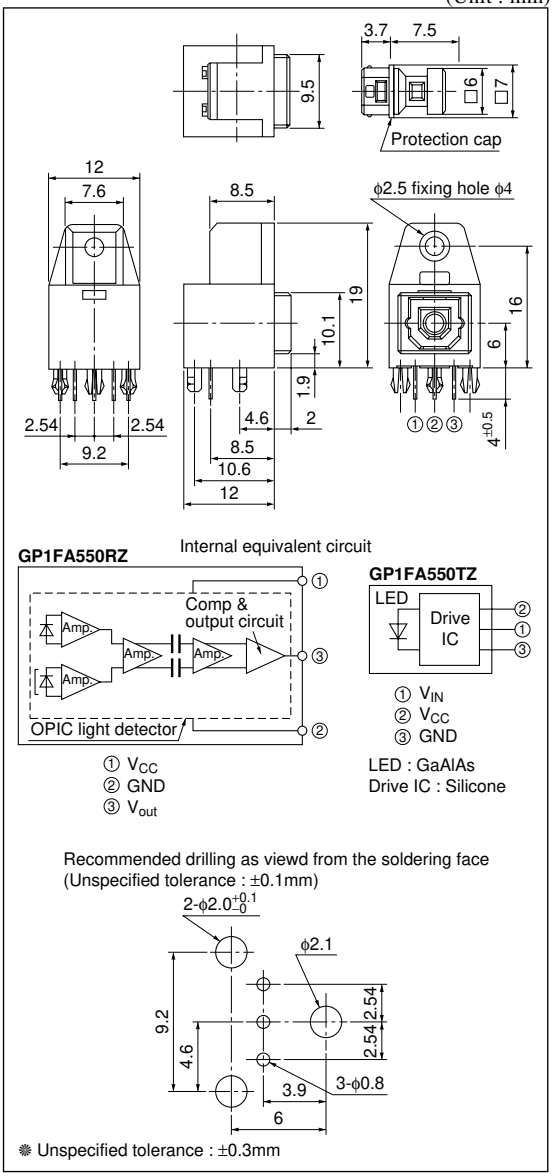
1. DVD players
2. CD players
3. MD players

■ Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Rating	Unit
Supply voltage	V_{CC}	−0.5 to +7.0	V
Output current (**GP1FA550RZ**)	I_{OH}	4 (Source current)	mA
	I_{OL}	4 (Sink current)	
Input voltage (**GP1FA550TZ**)	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)

■ 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 (GP1FA550TZ)

(Ta=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	Mbps

*2 NRZ signal, duty 50%

■ Recommended Operating Conditions (GP1FA550RZ)

(Ta=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	Mbps
*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 **GP1FA550RZ** are not fixed constantly when it receivers the modulating light (including DC light, no input light) less than 0.1Mbps

*5 Peak emission value

■ Electro-optical Characteristics (GP1FA550TZ)

(Ta=25°C, Vcc=5V)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Peak emission wavelength	λ_p	–	630	660	690	nm
Optical 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 (GP1FA550RZ)

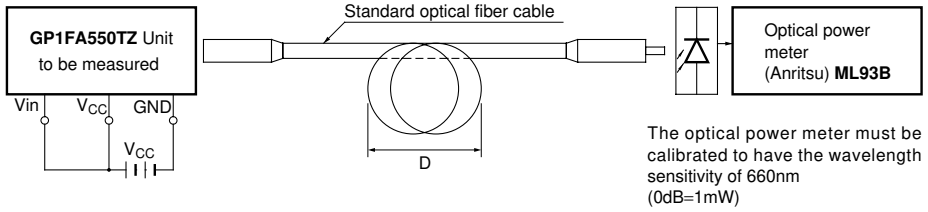
(Ta=25°C, Vcc=5V)

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

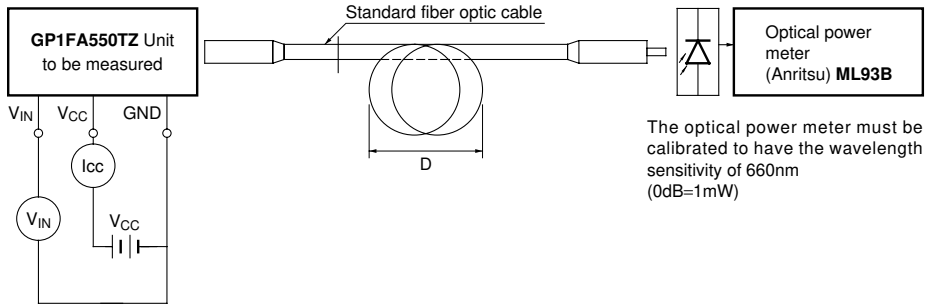
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Insertion force, withdrawal force	–	Initial value when a **GP1C331** in used.	6	–	40	N

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=10cm or more
(The standard fiber optic cable will be specified elsewhere.)

Fig.2 Measuring Method of Intput Voltage and Supply Current

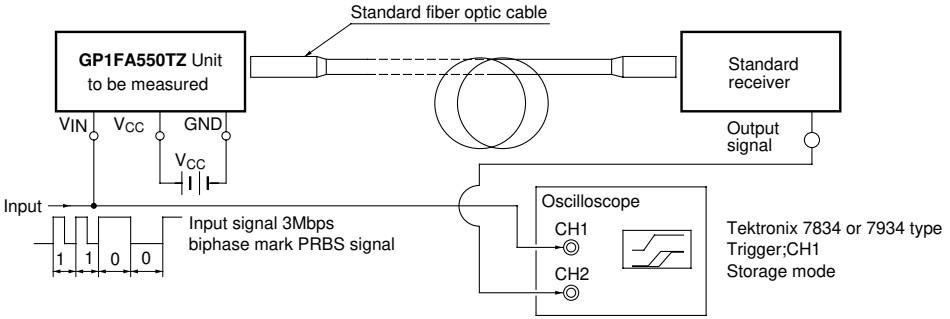


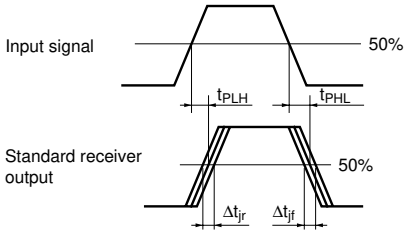
Input conditions and judgement method

Conditions	Judgement method
V_{IN}=2.0V or more	−21≤P_C≤−15dBm, I_{CC}=10mA or less
V_{IN}=0.8V or less	P_C≤−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	$\Delta t_w = t_{pHL} - t_{pHL}$
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_{jf}	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 1MΩ and less than 10pF

Fig.4 Supply Current

Input conditions		Measuring method
Supply voltage	V_{CC}=5.0V	Measured on an ammeter (DC average amperage)
Fiber coupling light output	P_C=−14.5dBm	
Standard transmitter input signal	6Mbps NRZ, Duty 50% or 3Mbps biphase mark PRBS signal	

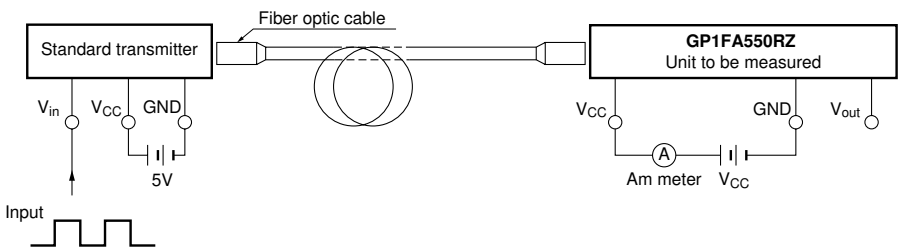
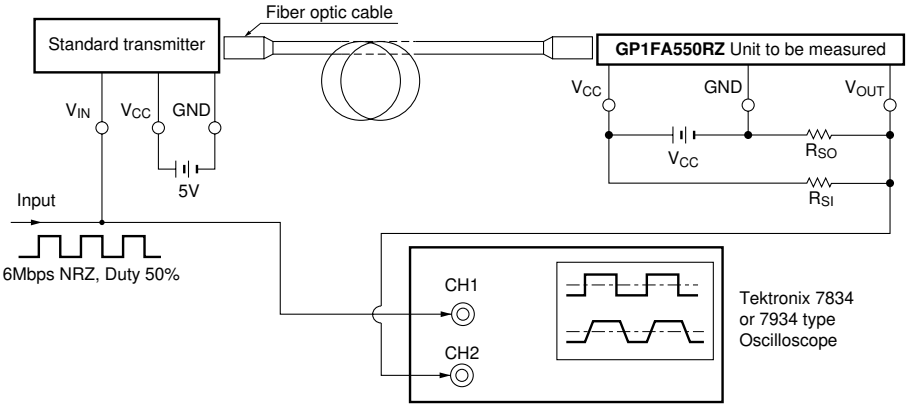
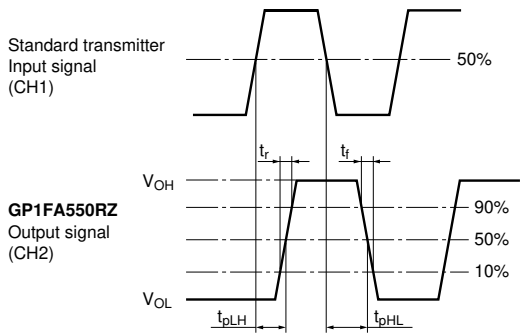


Fig.5 Measuring Method of Output Voltage and Pulse Response



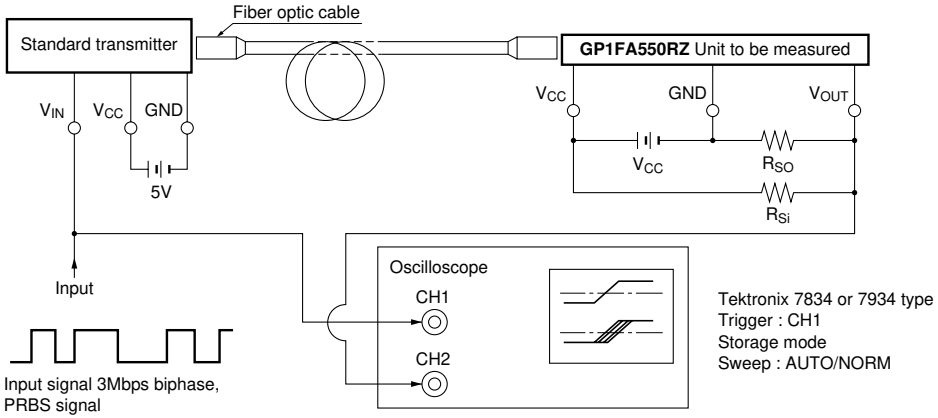
Test item

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 1MΩ and less than 10pF
(4) R_{SI}, R_{SO}:Standard load resistance (R_{SI}:3.3kΩ, R_{SO}:2.2kΩ)
(5) The output (H/L level) of **GP1FA550RZ** are not fixed constantly when it receives the modulating light (including DC light, no input light) less than 0.1Mbps

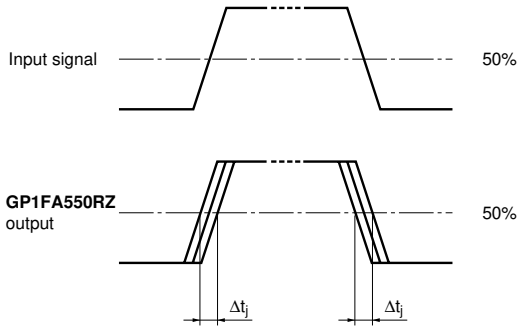
Fig.6 Measuring Method of Jitter



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 −14.5dBm/−24dBm
(2) R_{SI}, R_{SO}:Standard load resistance (R_{SI}:3.3kΩ, R_{SO}:2.2kΩ)
(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}=5.0V (State of operating)
(5) The probe for the oscilloscope must be more than 1M Ω and less than 10pF



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