

# GP1FA551TZ/ GP1FA551RZ

## ■ Features

1. High speed transmission of high quality audio signal such as DVD players and AV amplifiers.  
Signal transmission speed:MAX.13.2Mbps (NRZ signal)
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 (Ta=25°C)

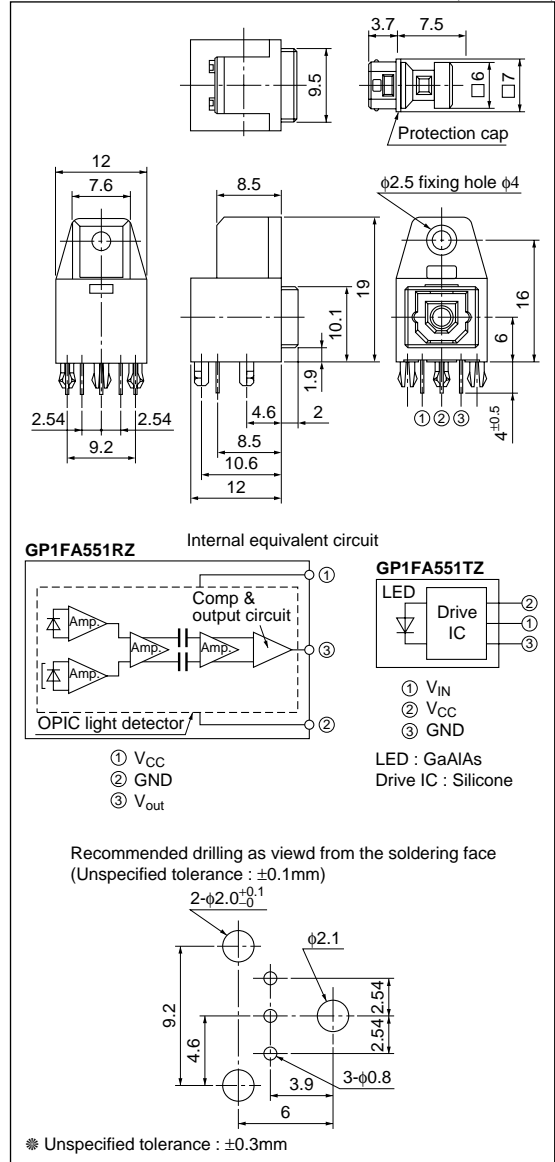
Parameter	Symbol	Rating	Unit
Supply voltage	V <sub>CC</sub>	-0.5 to +7.0	V
Output current (GP1FA551RZ)	I <sub>OH</sub>	2 (Source current)	mA
	I <sub>OL</sub>	10 (Sink current)	
Input voltage (GP1FA551TZ)	V <sub>IN</sub>	-0.5 to V <sub>CC</sub> +0.5	V
Operating temperature	T <sub>opr</sub>	-20 to +70	°C
Storage temperature	T <sub>stg</sub>	-30 to +80	°C
*1 Soldering temperature	T <sub>sol</sub>	260	°C

\*1 For 5s (2 times or less)

## High Transmission Speed Type 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 (GP1FA551TZ) (Ta=25°C)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Operating supply voltage	V <sub>CC</sub>	4.75	5.0	5.25	V
*2 Operating transfer rate	T	–	–	13.2	Mbps

\*2 NRZ signal, duty 50%

### ■ Recommended Operating Conditions (GP1FA551RZ) (Ta=25°C)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Operating supply voltage	V <sub>CC</sub>	4.75	5.0	5.25	V
*3*4 Operating transfer rate	T	0.1	–	13.2	Mbps
*5 Input optical power level	P <sub>c</sub>	–24.0	–	–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 GP1FA551RZ are not fixed constantly when it receives the modulating light (including DC light, no input light) less than 0.1Mbps

\*5 Peak emission value

### ■ Electro-optical Characteristics (GP1FA551TZ) (Ta=25°C, V<sub>CC</sub>=5V)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Peak emission wavelength	$\lambda_p$	–	630	660	690	nm
Optical output coupling with fiber	P <sub>c</sub>	Refer to Fig.1	–21	–18	–15	dBm
Dissipation current	I <sub>CC</sub>	Refer to Fig.2	–	8	13	mA
High level input voltage	V <sub>IH</sub>	Refer to Fig.2	2.1	–	–	V
Low level input voltage	V <sub>IL</sub>	Refer to Fig.2	–	–	0.8	V
Low→High delay time	t <sub>pLH</sub>	Refer to Fig.3	–	–	180	ns
High→Low delay time	t <sub>pHL</sub>	Refer to Fig.3	–	–	180	ns
Pulse width distortion	$\Delta t_w$	Refer to Fig.3	–15	–	+15	ns
Jitter	$\Delta t_j$	Refer to Fig.3	–	1	15	ns

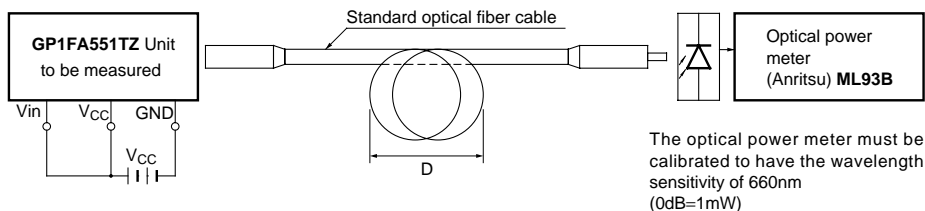
### ■ Electro-optical Characteristics (GP1FA551RZ) (Ta=25°C, V<sub>CC</sub>=5V)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Peak sensitivity wavelength	$\lambda_p$	–	–	700	–	nm
Dissipation current	I <sub>CC</sub>	Refer to Fig.4	–	15	25	mA
High level output voltage	V <sub>OH</sub>	Refer to Fig.5	2.7	3.5	–	V
Low level output voltage	V <sub>OL</sub>	Refer to Fig.5	–	0.2	0.4	V
Rise time	t <sub>r</sub>	Refer to Fig.5	–	17	23	ns
Fall time	t <sub>f</sub>	Refer to Fig.5	–	7	15	ns
Low→High delay time	t <sub>pLH</sub>	Refer to Fig.5	–	–	180	ns
High→Low delay time	t <sub>pHL</sub>	Refer to Fig.5	–	–	180	ns
Pulse width distortion	$\Delta t_w$	Refer to Fig.5	–20	–	+20	ns
Jitter	$\Delta t_j$	Refer to Fig.6, P <sub>c</sub> =–14.5dBm	–	1	15	ns
		Refer to Fig.6, P <sub>c</sub> =–24dBm	–	–	15	ns

### ■ Mechanical Characteristics

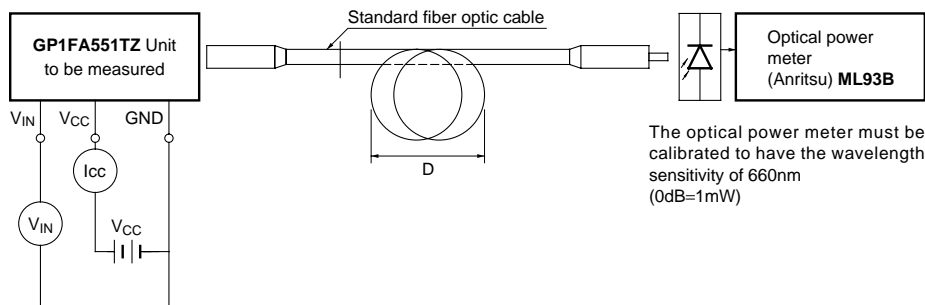
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Insertion force, withdrawal force	–	Initial value when a GP1C331 is in used.	6	–	40	N

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  $D=10\text{cm}$  or more  
 (The standard fiber optic cable will be specified elsewhere.)

Fig.2 Measuring Method of Input Voltage and Supply Current

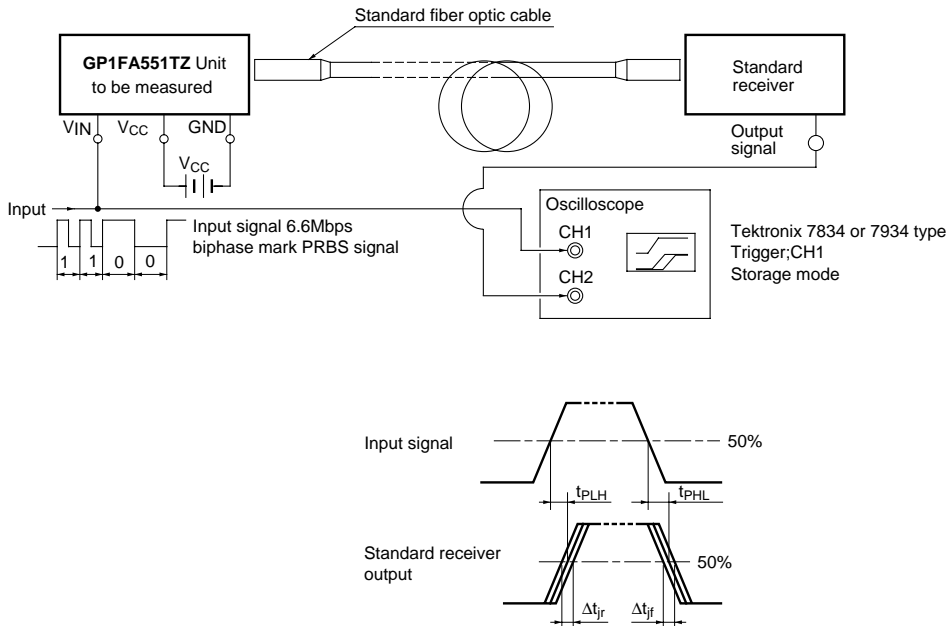


## Input conditions and judgement method

Conditions	Judgement method
$V_{IN}=2.1\text{V}$ or more	$-21\leq P_C\leq -15\text{dBm}$ , $I_{CC}=13\text{mA}$ or less
$V_{IN}=0.8\text{V}$ or less	$P_C\leq -36\text{dBm}$ , $I_{CC}=13\text{mA}$ or less

Note  $V_{CC}=5.0\text{V}$  (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	$\Delta t_w$	$\Delta t_w = t_{pHL} - t_{pLH}$
Low→High jitter	$\Delta t_{jr}$	Set the trigger on the rise of input signal to measure the jitter of the rise of output
High→Low jitter	$\Delta t_{jf}$	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  $1M\Omega$  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	13.2Mbps NRZ, Duty 50% or 6.6Mbps biphasic mark PRBS signal	

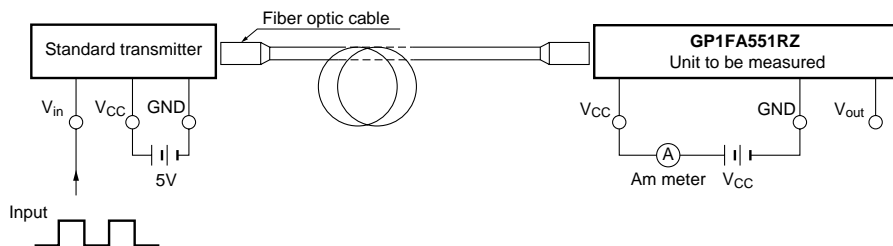
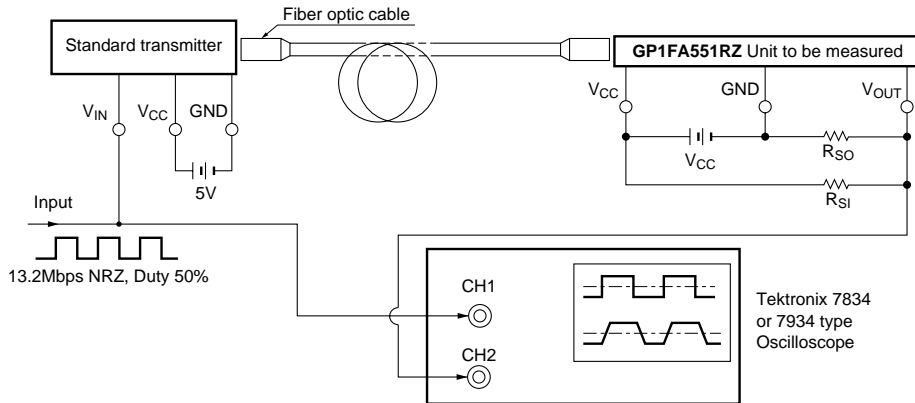


Fig.5 Measuring Method of Output Voltage and Pulse Response



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 $\Delta t_w = t_{pHL} - t_{pLH}$	$\Delta t_w$
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 **GP1FA551RZ** are not fixed constantly when it receives the modulating light (including DC light, no input light) less than 0.1Mbps

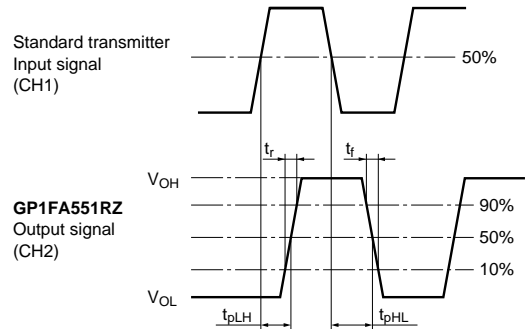
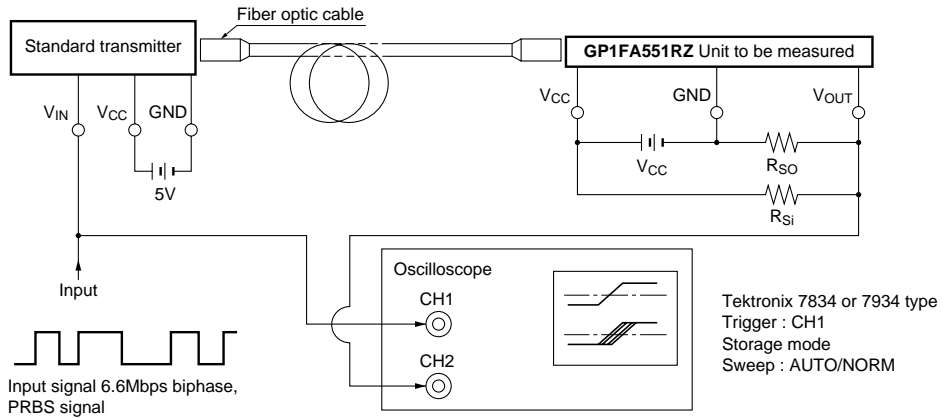


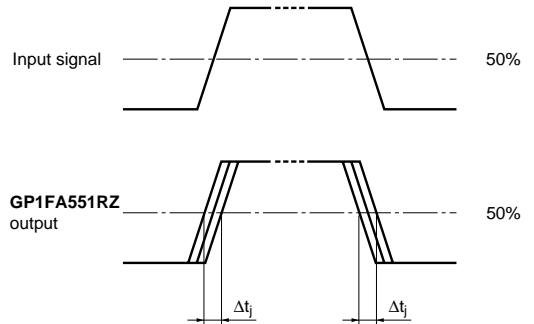
Fig.6 Measuring Method of Jitter



Test item

Test item	Symbol	Test condition
Jitter	$\Delta t_j$	Set the trigger on the rise of input signal to measure the jitter of the rise of output
Jitter	$\Delta t_j$	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<sub>SI</sub>, R<sub>SO</sub>:Standard load resistance (R<sub>SI</sub>:3.3k $\Omega$ , R<sub>SO</sub>:2.2k $\Omega$ )
  - (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<sub>CC</sub>=5.0V (State of operating)
  - (5) The probe for the oscilloscope must be more than 1M  $\Omega$  and less than 10pF



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