

GP1FA550TZ/ GP1FA550RZ

■ Features

1. Uni-directional 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)

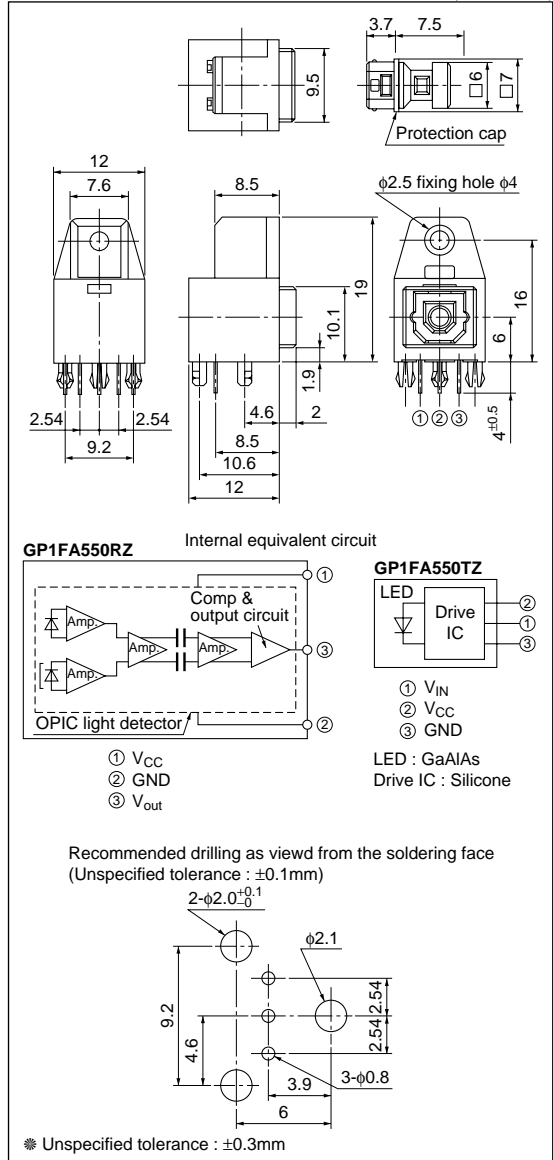
| Parameter | Symbol | Rating | Unit |
|--------------------------------|------------------|------------------------------|------|
| Supply voltage | V _{CC} | -0.5 to +7.0 | V |
| Output current (GP1FA550RZ) | I _{OH} | 4 (Source current) | mA |
| | I _{OL} | 4 (Sink current) | |
| Input voltage (GP1FA550TZ) | 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)

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 (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 receives the modulating light (including DC light, no input light) less than 0.1Mbps

*5 Peak emission value

■ Electro-optical Characteristics (GP1FA550TZ) (Ta=25°C, V_{CC}=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 |

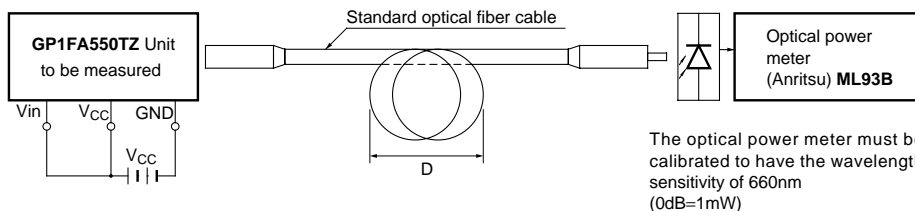
■ Electro-optical Characteristics (GP1FA550RZ) (Ta=25°C, V_{CC}=5V)

| 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

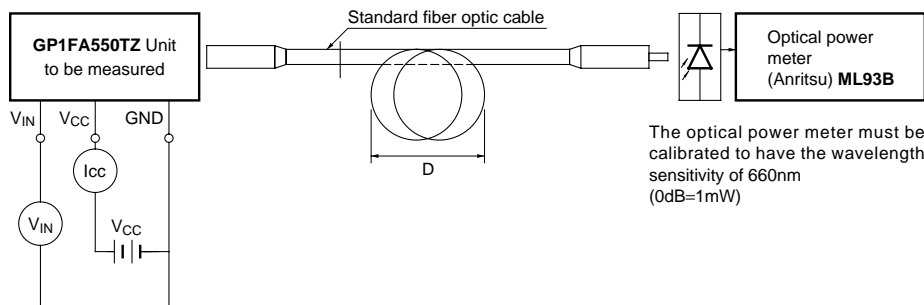
| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|-----------------------------------|--------|---------------------------------------|------|------|------|------|
| Insertion force, withdrawal force | – | Initial value when a GP1C331 is used. | 6 | – | 40 | N |

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

Fig.2 Measuring Method of Input Voltage and Supply Current

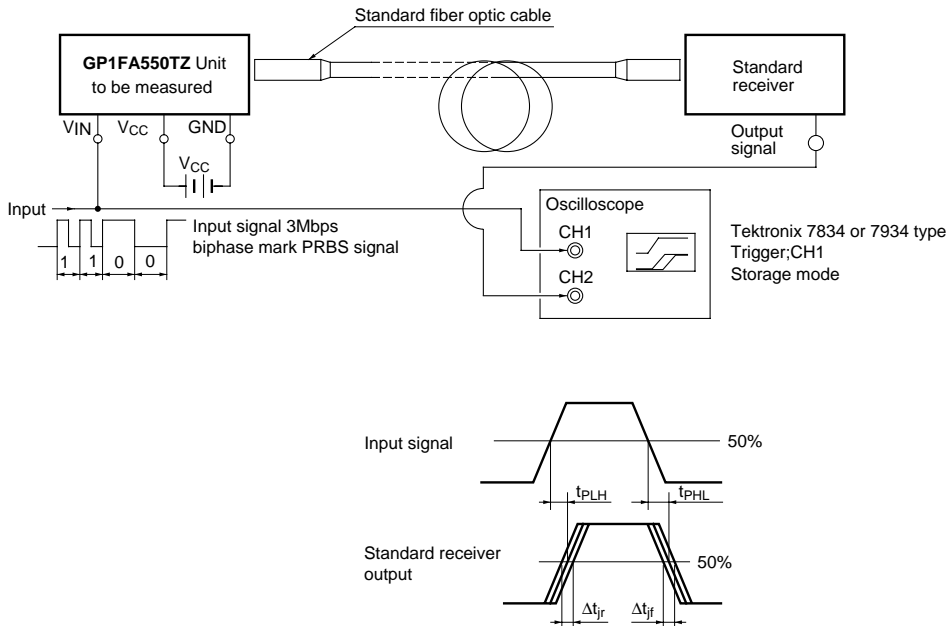


Input conditions and judgement method

| Conditions | Judgement method |
|------------------------------|--|
| $V_{IN}=2.0\text{V}$ or more | $-21\leq P_C\leq -15\text{dBm}$, $I_{CC}=10\text{mA}$ or less |
| $V_{IN}=0.8\text{V}$ or less | $P_C\leq -36\text{dBm}$, $I_{CC}=10\text{mA}$ 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 | 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_{jr} | 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 | 6Mbps NRZ, Duty 50% or 3Mbps biphas mark PRBS signal | |

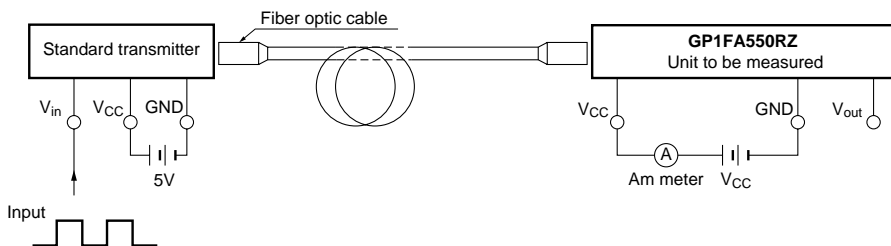
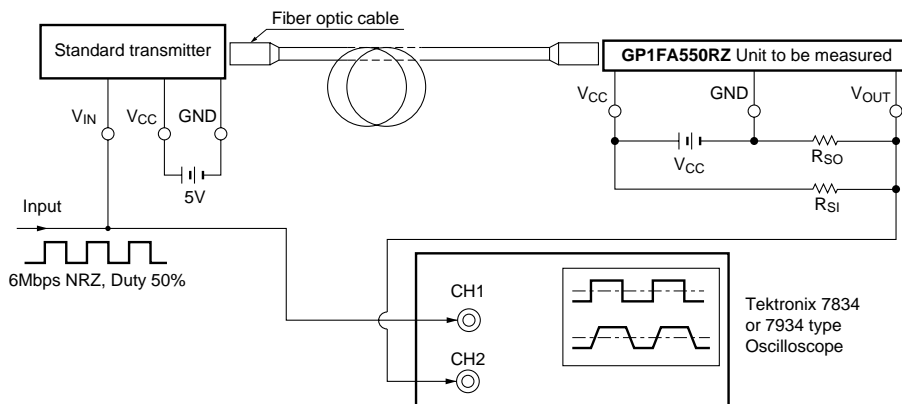


Fig.5 Measuring Method of Output Voltage and Pulse Response



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

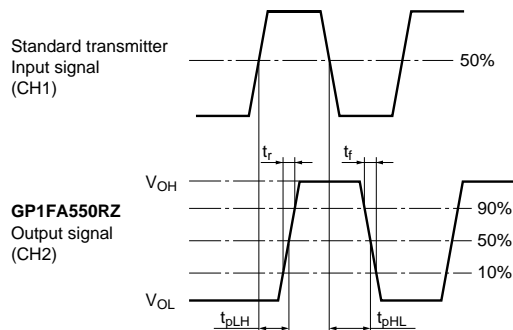
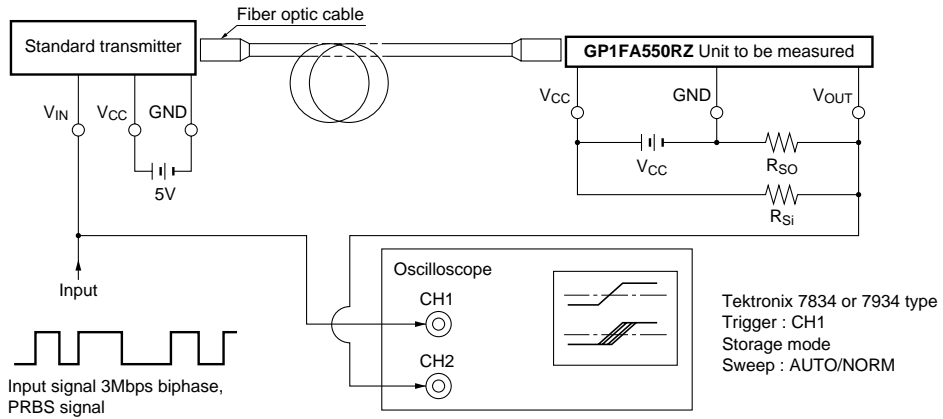


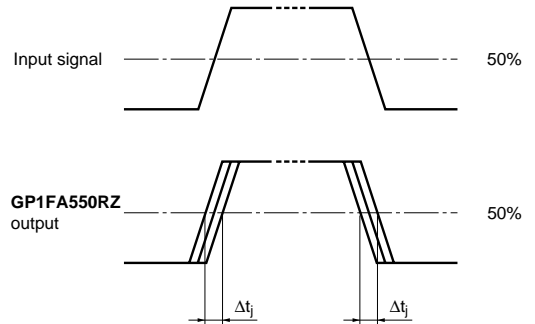
Fig.6 Measuring Method of Jitter



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 $-14.5\text{dBm}/-24\text{dBm}$
 (2) R_{SI}, R_{SO}:Standard load resistance (R_{SI}:3.3k Ω , R_{SO}:2.2k Ω)
 (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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