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# GP1FA512TZ/ GP1FA512RZ

## Shutter System Fiber Optic Transmitter/ Receiver

## ■ Features

1. Shutter system unnecessary to remove the protection cap
2. Uni-directional data transmission using plastic optical fiber
3. High transfer rate:T=13.2Mb/s
4. The optical receiver can be directly connectable the TTL, due to the use of *OPIC

## ■ Applications

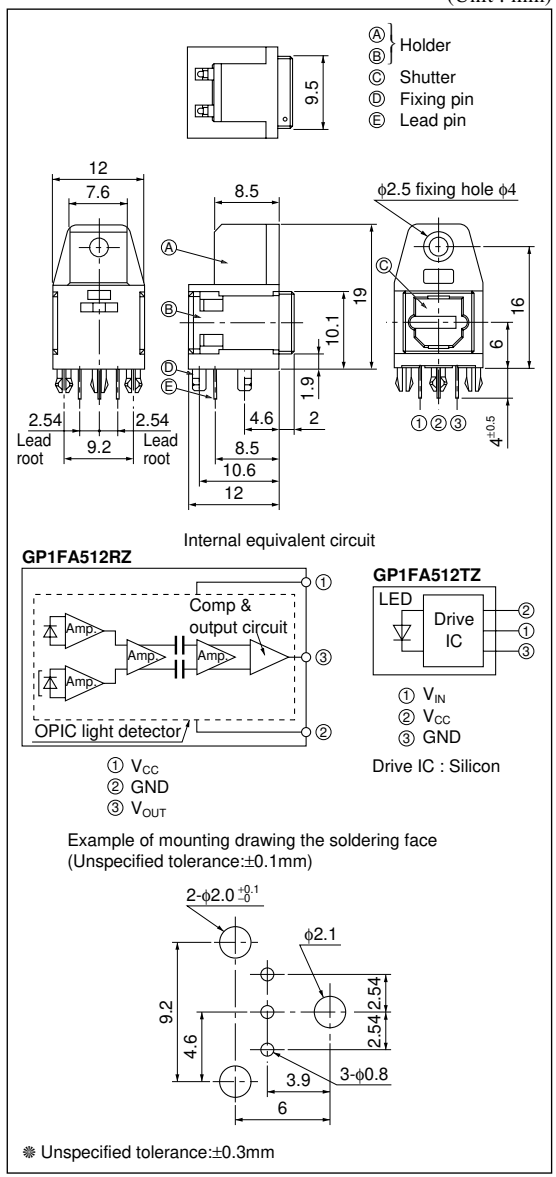
1. DVD players
2. STB
3. AV amplifier

## ■ Absolute Maximum Ratings ($T_a$=25°C)

| Parameter | Symbol | Rating | Unit |
|---|---|---|---|
| Supply voltage | $V_{CC}$ | −0.5 to +7.0 | V |
| Output current (**GP1FA512RZ**) | $I_{OH}$ | 2 (Source current) | mA |
| | $I_{OL}$ | 10 (Sink current) | |
| Input voltage (**GP1FA512TZ**) | $V_{IN}$ | −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 (GP1FA512TZ)

($T_a$=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 | – | – | 13.2 | Mb/s |

*2 NRZ signal duty 50%

## ■ Recommended Operating Conditions (GP1FA512RZ)

($T_a$=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 | – | 13.2 | 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 **GP1FA512RZ** are not fixed constantly when it receivers the modulating light (including DC light, no input light) less than 0.1Mb/s
*5 Peak optical output

## ■ Electro-optical Characteristics (GP1FA512TZ)

($T_a$=25°C, $V_{CC}$=5V)

| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|---|---|---|---|---|---|---|
| Peak emission wavelength | $\lambda_p$ | – | 630 | 660 | 690 | nm |
| Optical power output coupling with fiber | $P_C$ | Refer to Fig.1 | –21 | –18 | –15 | dBm |
| Dissipation current | $I_{CC}$ | Refer to Fig.2 | – | 8 | 13 | mA |
| High level input voltage | $V_{IH}$ | Refer to Fig.2 | 2.1 | – | – | V |
| Low level input voltage | $V_{IL}$ | Refer to Fig.2 | – | – | 0.8 | V |
| Low→High delay time | $t_{pLH}$ | Refer to Fig.3 | – | – | 180 | ns |
| High→Low delay time | $t_{pHL}$ | 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 (GP1FA512RZ)

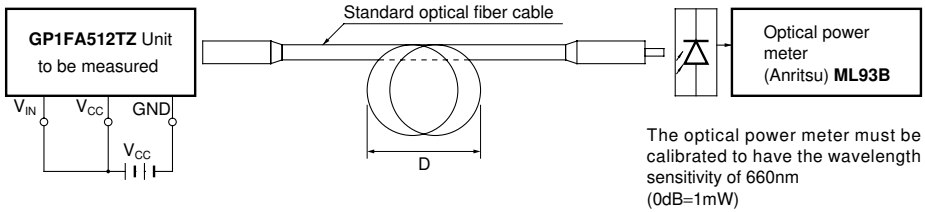
($T_a$=25°C, $V_{CC}$=5V)

| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|---|---|---|---|---|---|---|
| Peak sensitivity wavelength | $\lambda_p$ | – | – | 700 | – | nm |
| Dissipation current | $I_{CC}$ | Refer to Fig.4 | – | 15 | 25 | 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 | – | 17 | 23 | ns |
| Fall time | $t_f$ | Refer to Fig.5 | – | 7 | 15 | ns |
| Low→High delay time | $t_{pLH}$ | Refer to Fig.5 | – | – | 180 | ns |
| High→Low delay time | $t_{pHL}$ | 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, $P_C$=–14.5dBm | – | 1 | 15 | ns |
| | | Refer to Fig.6, $P_C$=–24dBm | – | – | 15 | ns |

## ■ Mechanical Characteristics

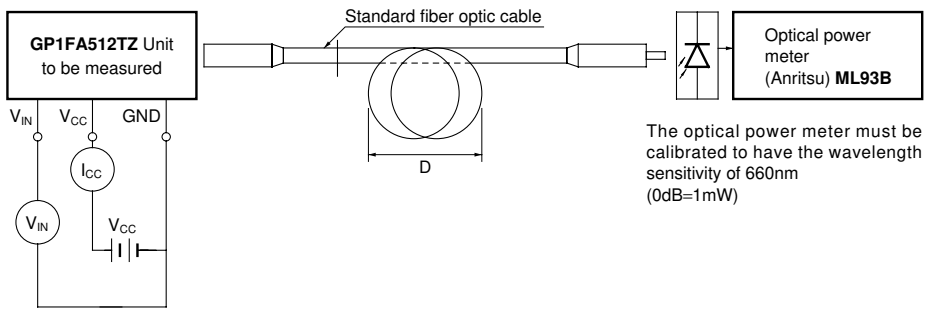
| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|---|---|---|---|---|---|---|
| Insertion force, withdrawal force | – | Initial value when a **GP1C331** in used | 6 | – | 40 | N |

## 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

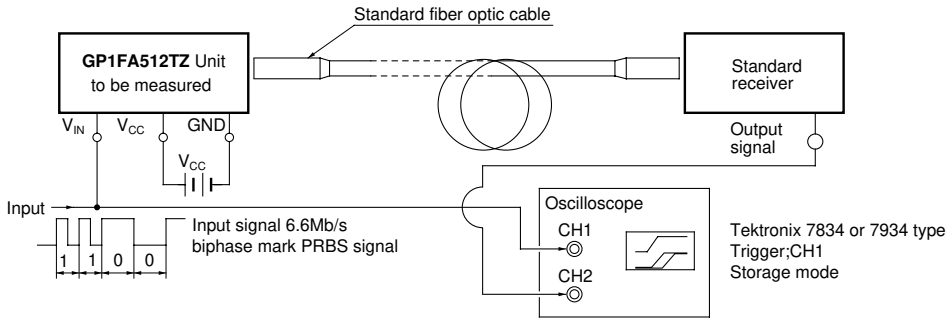


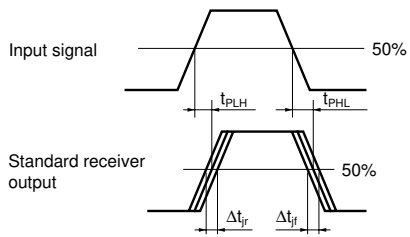

Input conditions and judgement method

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

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

## Fig.3 Measuring Method of Pulse Response and Jitter



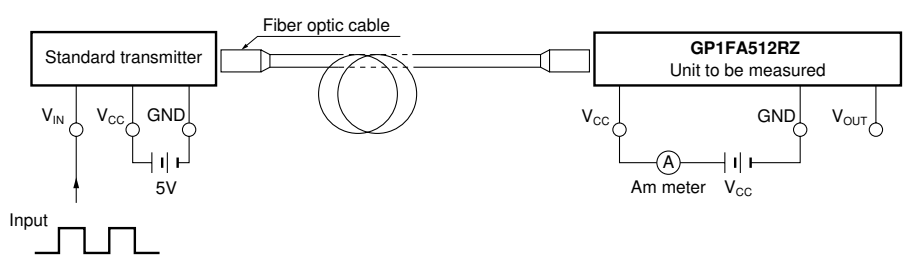




| Parameter | Symbol | Conditions |
|---|---|---|
| Low→High delay time | $t_{pLH}$ | Refer to the above mentioned prescription |
| High→Low delay time | $t_{pHL}$ | Refer to the above mentioned prescription |
| Pulse width distortion | $\Delta t_w$ | $\Delta t_w = t_{pHL} - t_{pLH}$ |
| Low→High jitter | $\Delta t_{jr}$ | 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 |

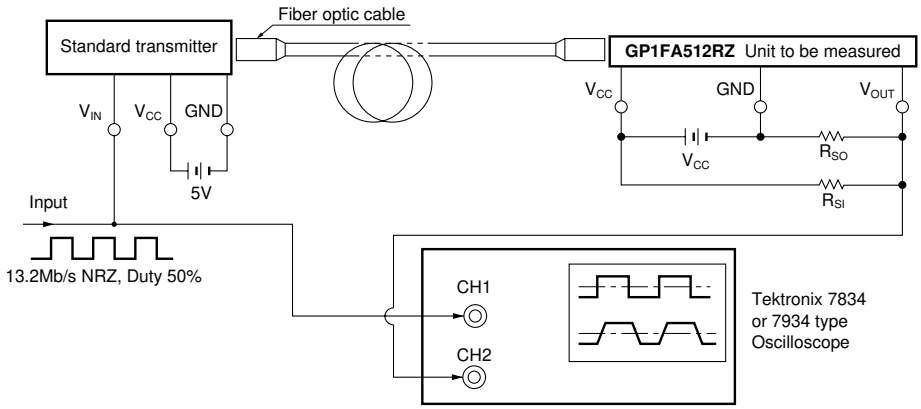
Notes (1) The waveform write time shall be 4s. But do not allow the waveform to be distorted by increasing the brightness too much
(2) $V_{CC}$=5.0V (State of operating)
(3) The probe for the oscilloscope must be more than 1MΩ and less than 10pF

## 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 | 13.2Mb/s NRZ, Duty 50% or 6.6Mb/s biphase mark PRBS signal | |

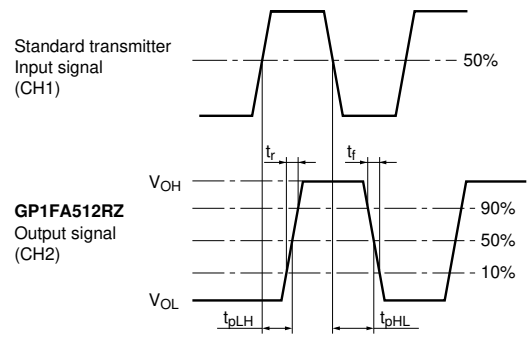


## Fig.5 Measuring Method of Output Voltage and Pulse Response



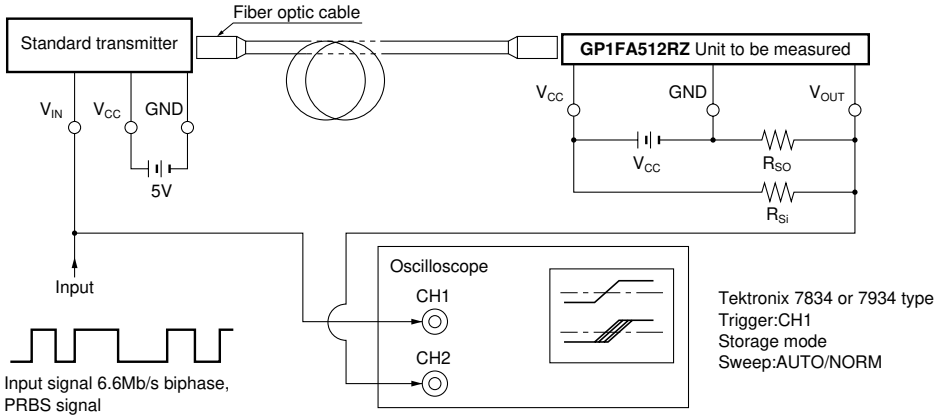

Test item

| 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 $\Delta t_w = t_{pHL} - t_{pLH}$ | $\Delta t_w$ |
| 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 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 **GP1FA512RZ** are not fixed constantly when it receives the modulating light (including DC light, no input light) less than 0.1Mb/s

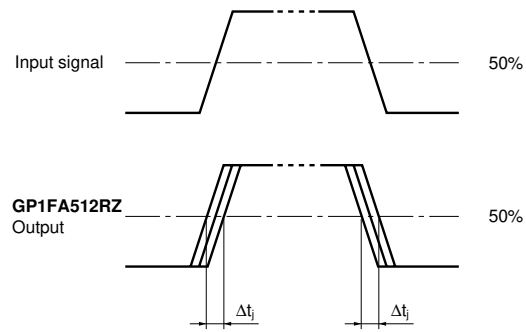
## Fig.6 Measuring Method of Jitter




Test item

| Test item | Symbol | Test condition |
|---|---|---|
| Jitter | $\Delta t_j$ | 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 −14.5dBm/−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 1MΩ and less than 10pF



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