

# GP1FE500TK/ GP1FE500RK

## ■ Features

- Optimum height for mounting on PC  
(Center height:7mm)
- The Optical receiver can judge optical or electrical signal and transmit optical/electrical signal
- Unidirectional signal transmission for plastic optical fiber cables
- The optical receiver can be directly connected with the TTL, due to the use of OPIC
- For fiber-optic cables, use our **GP1C331/GP1C331A/GP1C335** cables

## ■ Applications

- Personal computers
- DVD players
- CD players
- 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<br>(GP1FE500RK) | I <sub>OH</sub><br>I <sub>OL</sub> | 4 (Source current)<br>4 (Sink current) | mA   |
| Input voltage (GP1FE500TK)     | 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)

## ■ Absolute Maximum Ratings (Jack) (Ta=25°C)

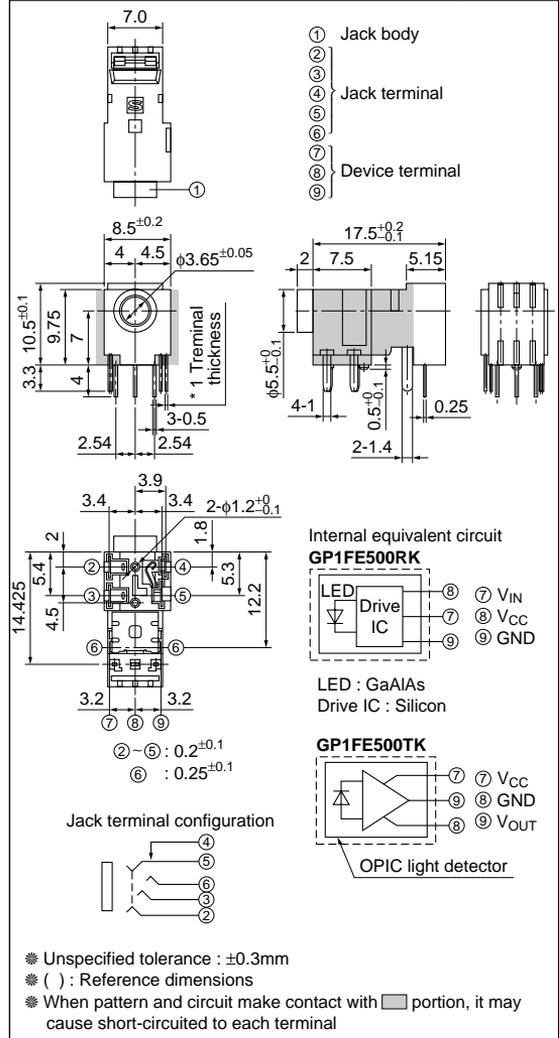
| Parameter                | Symbol                 | Rating       | Unit |
|--------------------------|------------------------|--------------|------|
| Total power dissipation  | P <sub>tot</sub>       | D.C. 12V, 1A | -    |
| Operating temperature    | T <sub>opr</sub>       | -20 to +70   | °C   |
| Storage temperature      | T <sub>stg</sub>       | -30 to +80   | °C   |
| *1 Soldering temperature | T <sub>sol</sub>       | 260          | °C   |
| *2 Isolation voltage     | V <sub>iso</sub> (rms) | A.C. 500V    | -    |

\*2 For 1min

## Fiber Optic Transmitter/Receiver (Optical Mini-Jack)

## ■ 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 (GP1FE500TK) (Ta=25°C)

| Parameter                | Symbol          | MIN. | TYP. | MAX. | Unit |
|--------------------------|-----------------|------|------|------|------|
| Operating supply voltage | V <sub>CC</sub> | 4.75 | 5.0  | 5.25 | V    |
| Operating transfer rate  | T               | –    | –    | 8    | Mbps |

### ■ Recommended Operating Conditions (GP1FE500RK) (Ta=25°C)

| Parameter                          | Symbol          | MIN.  | TYP. | MAX.  | Unit |
|------------------------------------|-----------------|-------|------|-------|------|
| Operating supply voltage           | V <sub>CC</sub> | 4.75  | 5.0  | 5.25  | V    |
| Operating transfer rate            | T               | 0.1   | –    | 8     | Mbps |
| Receiver input optical power level | P <sub>c</sub>  | –24.0 | –    | –14.5 | dBm  |

### ■ Electro-optical Characteristics (GP1FE500TK)

(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 power output coupling with fiber | P <sub>c</sub>   | Refer to Fig.1 | –21  | –17  | –15  | dBm  |
| Dissipation current                      | I <sub>CC</sub>  | Refer to Fig.2 | –    | 4    | 10   | mA   |
| High level input voltage                 | V <sub>IH</sub>  | Refer to Fig.2 | 2    | –    | –    | 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 | –    | –    | 100  | ns   |
| High→Low delay time                      | t <sub>pHL</sub> | Refer to Fig.3 | –    | –    | 100  | ns   |
| Pulse width distortion                   | $\Delta t_w$     | Refer to Fig.3 | –25  | –    | +25  | ns   |
| Jitter                                   | $\Delta t_j$     | Refer to Fig.3 | –    | 1    | 25   | ns   |

### ■ Electro-optical Characteristics (GP1FE500RK)

(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   | 40   | 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                           | –    | 12   | 30   | ns   |
| Fall time                   | t <sub>f</sub>   | Refer to Fig.5                           | –    | 4    | 30   | ns   |
| Low→High delay time         | t <sub>pLH</sub> | Refer to Fig.5                           | –    | –    | 100  | ns   |
| High→Low delay time         | t <sub>pHL</sub> | Refer to Fig.5                           | –    | –    | 100  | ns   |
| Pulse width distortion      | $\Delta t_w$     | Refer to Fig.5                           | –30  | –    | +30  | ns   |
| Jitter                      | $\Delta t_j$     | Refer to Fig.6, P <sub>c</sub> =–14.5dBm | –    | 1    | 30   | ns   |
|                             |                  | Refer to Fig.6, P <sub>c</sub> =–24dBm   | –    | –    | 30   | ns   |

### ■ Mechanical and Electrical Characteristics (Jack)

| Parameter                         | Symbol           | Conditions      | MIN. | TYP. | MAX. | Unit |
|-----------------------------------|------------------|-----------------|------|------|------|------|
| Insertion force, withdrawal force | F <sub>p</sub>   | *3              | 5    | –    | 35   | N    |
| Contact resistance                | R <sub>con</sub> | *4              | –    | –    | 30   | mΩ   |
| Isolation resistance              | R <sub>iso</sub> | D.C.500V, 1min. | 100  | –    | –    | MΩ   |

Note) This jack is designed for applicable to  $\phi 3.5$  compact single head plug (JIS C6560).

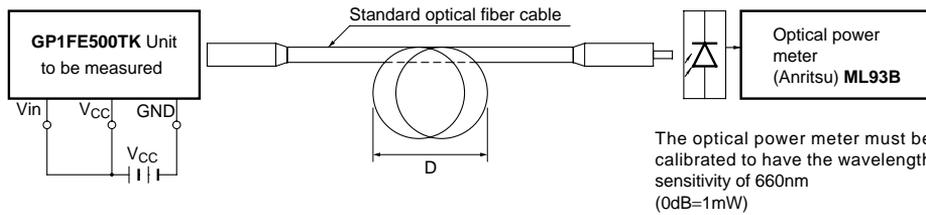
\*3 Measuring method of insertion force and withdrawal force.

Insertion and withdrawal force shall be measured after inserting and withdrawing 3 times by using JIS C6560 standard plug for test.

\*4 Measuring method of contact resistance.

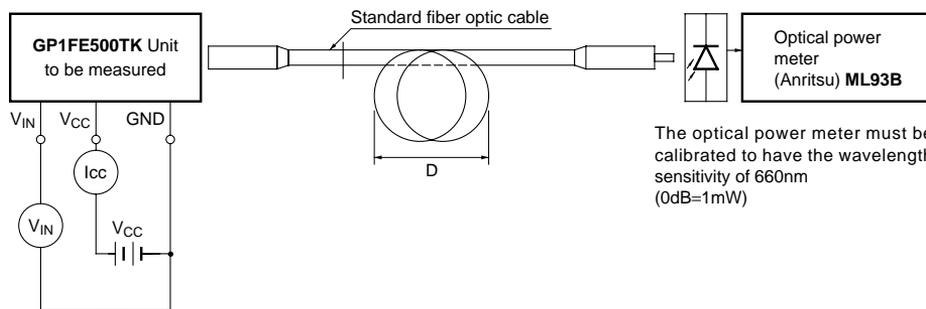
It measures at 100mA or less and 1 000Hz at the condition of inserting JIS C6560 standard plug for test in which movable contact terminal and contact point are described.

**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**

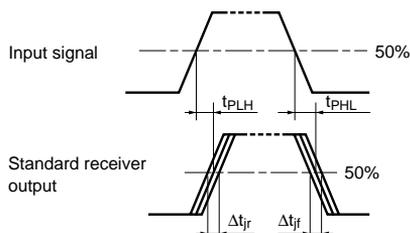
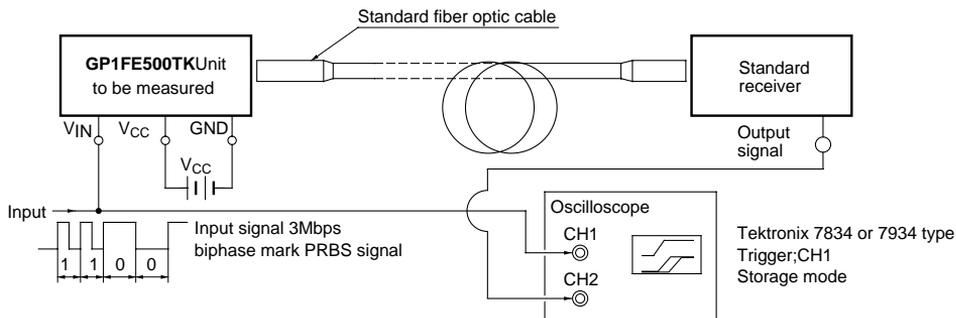


**Input conditions and judgement method**

| 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 | $\Delta t_w$    | $\Delta t_w = t_{pHL} - t_{pLH}$  |
| 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 | 6Mbps NRZ, Duty 50% or 3Mbps biphasic mark PRBS signal |  |

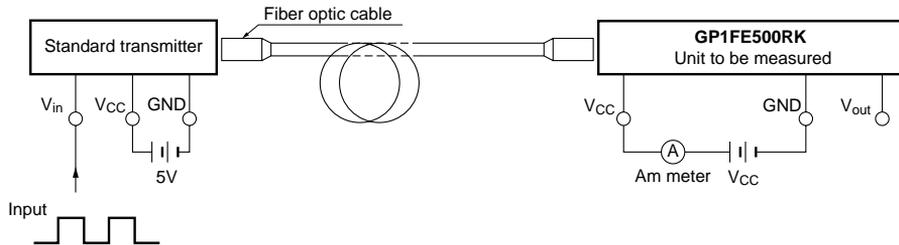
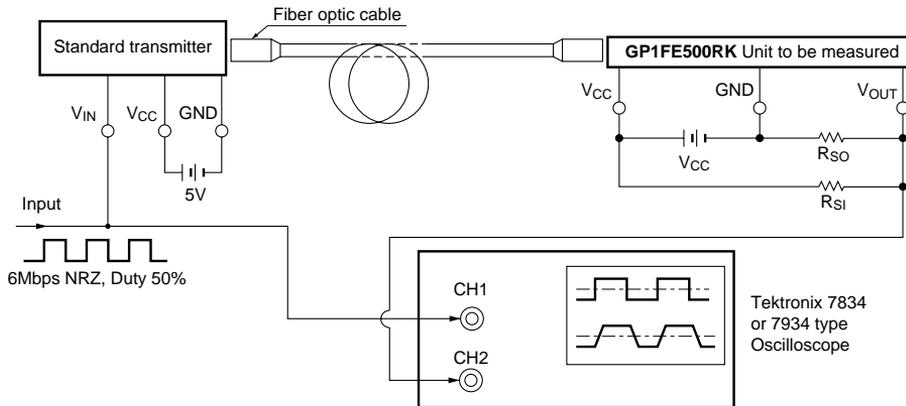


Fig.5 Measuring Method of Output Voltage and Pulse Response



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<br>$\Delta t_w = t_{pHL} - t_{pLH}$ | $\Delta t_w$ |
| 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 GP1FE500RK are not fixed constantly when it receives the modulating light (including DC light, no input light) less than 0.1Mbps

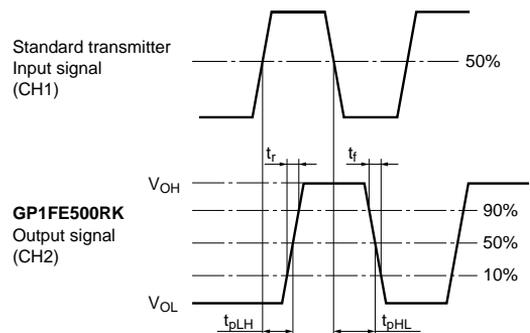
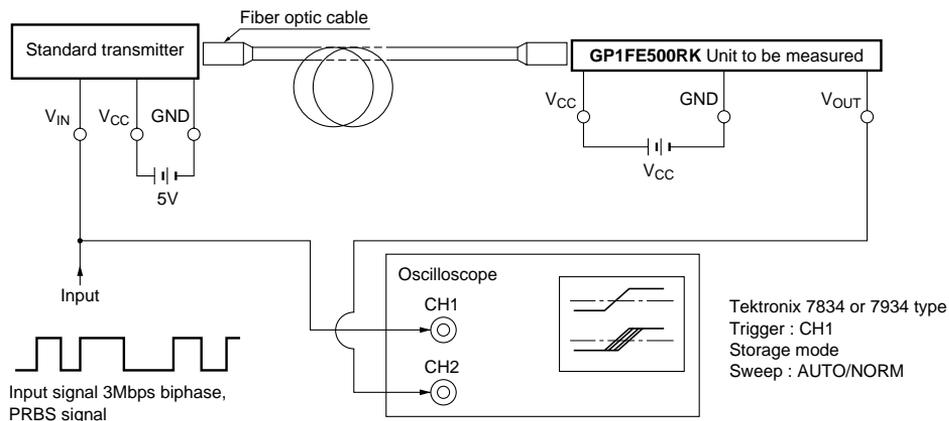


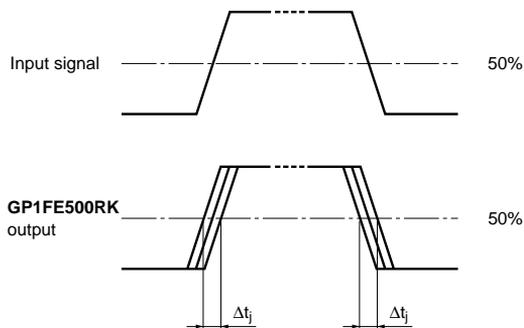
Fig.6 Measuring Method of Jitter



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)  $R_{S1}$ ,  $R_{S0}$ : Standard load resistance ( $R_{S1}: 3.3\text{k}\Omega$ ,  $R_{S0}: 2.2\text{k}\Omega$ )
  - (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  $10\text{pF}$



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