

# GP1F361T/GP1F361R

## Optical Mini-Jack for Digital Audio Equipment

### ■ Features

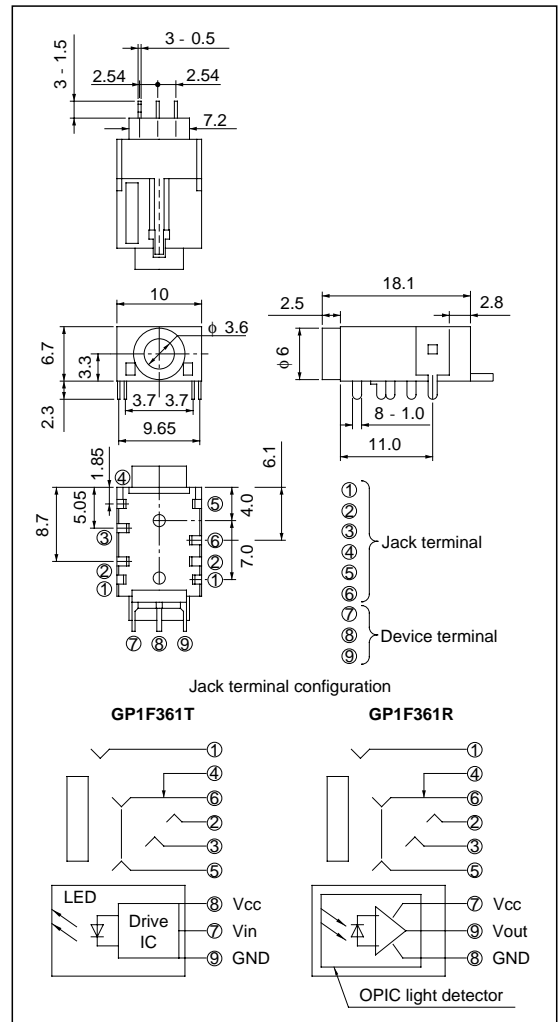
1. Electric and optical signal compatible design  
(Three kinds of terminals are integrated into a single unit.)
2. Compact design with small jack compatible mini-plug
3. OPIC type  
(Direct interface to microcomputer of the I/O signals)  
(High fidelity real sound reproduction)
4. High speed data transmission  
Signal transmission speed: MAX. 8Mbps  
(NRZ signal)
5. Low voltage drive (2.7V to 3.6V)

### ■ Applications

1. MD, DCC
2. Portable CD, DAT

### ■ Outline Dimensions

(Unit : mm)



\* OPIC is a trademark of Sharp and stands for Optical IC.  
It has light detecting element and signal processing circuitry integrated single chip.

## ■ Absolute Maximum Ratings

### GP1F361T/GP1F361R (Photoelectric conversion element)

Parameter	Symbol	Rating	Unit
Supply voltage	V <sub>CC</sub>	- 0.5 to + 7.0	V
Output current (GP1F361R)	I <sub>OH</sub>	2 (source current)	mA
	I <sub>OL</sub>	10 (sink current)	mA
Input voltage (GP1F361T)	V <sub>in</sub>	- 0.5 to V <sub>CC</sub> + 5.0	V
Operating temperature	T <sub>opr</sub>	- 20 to + 70	°C
Storage temperature	T <sub>stg</sub>	- 30 to + 80	°C
*1Soldering temperature	T <sub>sol</sub>	260	°C

### GP1F361T/GP1F361R (Jack)

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

\*1 5s/time up to 2 times.

## ■ Recommended Operating Conditions

### GP1F361T

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Supply voltage	V <sub>CC</sub>	2.7	3.0	3.6	V
Operating transfer rate	T	-	-	8	Mbps

### GP1F361R

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Supply voltage	V <sub>CC</sub>	2.7	3.0	3.6	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

### GP1F361T (Photoelectric conversion element)

(T<sub>a</sub> = 25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Peak emission wavelength	λ <sub>P</sub>	-	630	660	690	nm
Optical power output couple with fiber	P <sub>C</sub>	Refer to Fig. 1	- 21	- 17	- 15	dBm
Supply current	I <sub>CC</sub>	Refer to Fig. 2	-	8	12	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	Δtw	Refer to Fig. 3	- 30	-	+ 30	ns
Jitter	Δtj	Refer to Fig. 3	-	1	30	ns

## GP1F361R (Photoelectric conversion element)

(Ta = 25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit	
Peak sensitivity wavelength	$\lambda_P$	-	-	700	-	nm	
Supply current	$I_{CC}$	Refer to Fig. 4	-	12	15	mA	
High level output voltage	$V_{OH}$	Refer to Fig. 5	2.1	-	-	V	
Low level output voltage	$V_{OL}$	Refer to Fig. 5	-	-	0.4	V	
Rise time	$t_r$	Refer to Fig. 5	-	17	30	ns	
Fall time	$t_f$	Refer to Fig. 5	-	5	30	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	$\Delta tw$	Refer to Fig. 5	- 30	-	+ 30	ns	
Jitter	$P_C = -14.5\text{dBm}$	$\Delta t_j$	Refer to Fig. 6	-	1	30	ns
	$P_C = -24\text{dBm}$			-	-	30	ns

## ■ Mechanical and Electrical Characteristics

## GP1F361T/GP1F361R (Jack)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Insertion force, Withdrawal force	$F_P$	*2	5	-	35	N
Contact resistance	$R_{con}$	*3	-	-	30	mΩ
Isolation resistance	$R_{ISO}$	D.C. 500V, 1min.	100	-	-	MΩ

Note ) This jack is designed for applicable to  $\phi$  3.5 compact single head plug (EIAJ RC-6701A).

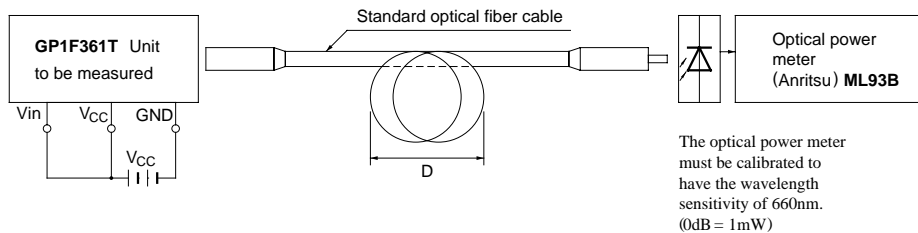
\*2 Measuring method of insertion force and withdrawal force.

Insertion and withdrawal force shall be measured after inserting and withdrawing 3 times by using EIAJ RC-6701A standard plug for test.

\*3 Measuring method of contact resistance.

About movable contact terminal and make contacts, it measures at 100mA or less and 1000Hz at the condition of inserting EIAJ 6701A standard plug for test.

### Fig. 1 Measuring Method Optical Output Coupling Fiber

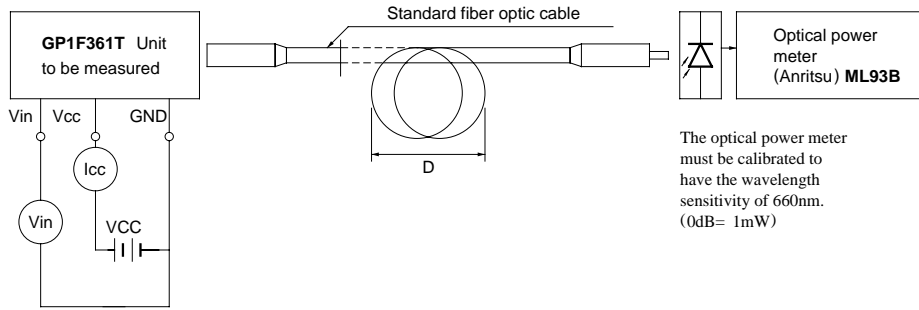


Note ) (1)  $V_{CC}$  ; 3.0V  $\pm$  0.05V (State of operating)

(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 Input Voltage and Supply Current

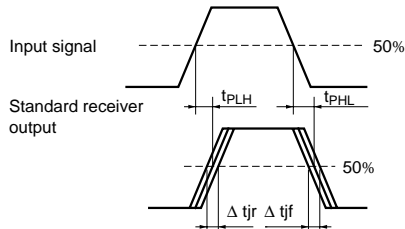
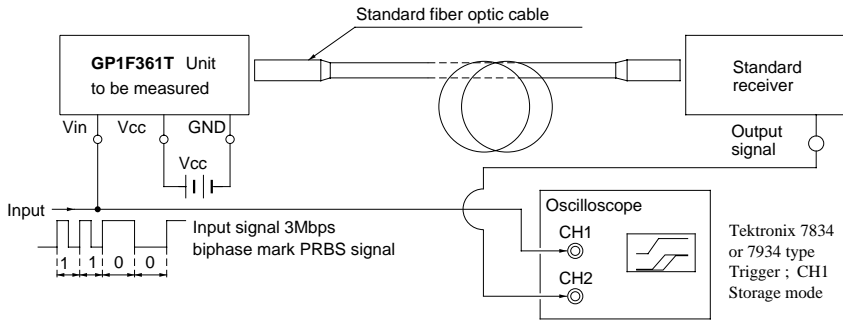


Input conditions and judgement method

Conditions	Judgement method
$V_{in} = 2.1V$ or more	$-21 \leq P_C \leq -15dBm$ , $I_{CC} = 12mA$ or less
$V_{in} = 0.8V$ or less	$P_C \leq -36dBm$ , $I_{CC} = 12mA$ or less

Note)  $V_{CC} = 3.0 \pm 0.05V$  (State of operating)

Fig. 3 Measuring Method of Pulse Response and Jitter



Test item

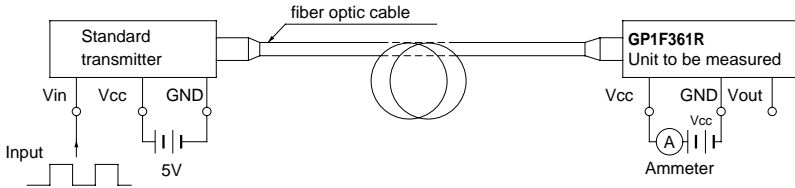
Test item	Symbol	Test condition
Low→High pulse delay time	$t_{PLH}$	-
High→Low pulse delay time	$t_{PHL}$	-
Pulse width distortion	$\Delta tw$	$\Delta tw = t_{PHL} - t_{PLH}$
Low→High Jitter	$\Delta t_{jr}$	Set the trigger on the rise of input signal to measure the jitter of the rise of output
High→Low 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 4 seconds. But do not allow the waveform to be distorted by increasing the brightness too much.  
 (2)  $V_{CC} = 3.0 \pm 0.05V$  (State of operating)  
 (3) The probe for the oscilloscope must be more than  $1M\Omega$  and less than  $10pF$ .

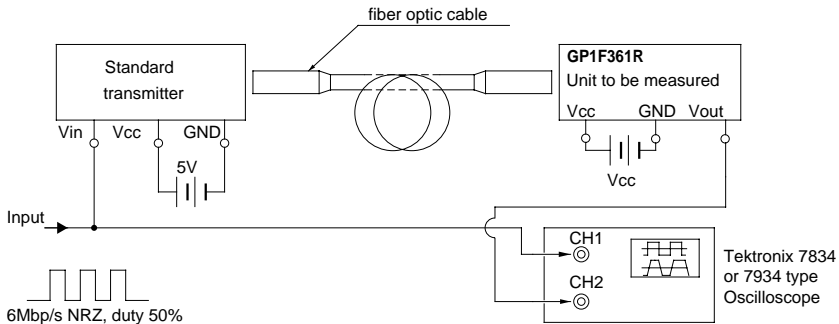
**Fig. 4 Supply Current**

Input conditions	Measuring method
Supply voltage	$V_{CC} = 3.0 \pm 0.05V$
Optical output coupling fiber	$P_C = -14.5dBm$
Standard transmitter input signal	6Mbps NRZ, Duty50 % or 3Mbps biphasic mark PRBS signal

Measured on an ammeter (DC average amperage)

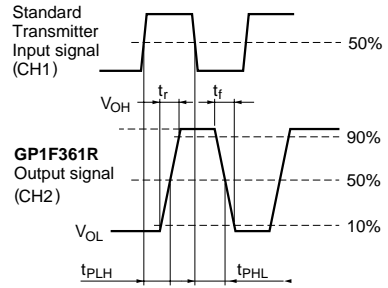


**Fig. 5 Measuring Method of Output Voltage and Pulse Response**



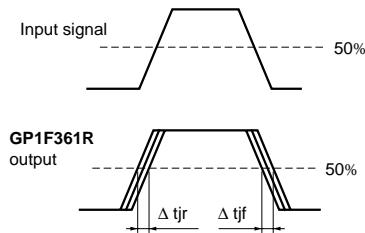
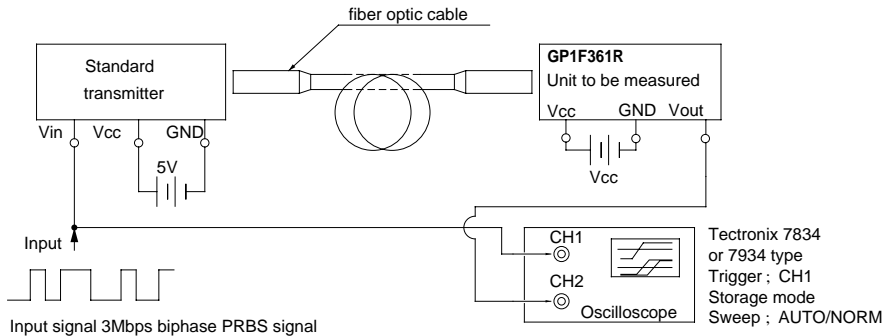
Test item

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 $\Delta tw = t_{PHL} - t_{PLH}$	$\Delta tw$
High level output voltage	$V_{OH}$
Low level output voltage	$V_{OL}$



- Notes
- (1)  $V_{CC} = 3.0 \pm 0.05V$  (State of operating)
  - (2) The fiber coupling light output set at -14.5dBm/ -24.0dBm.
  - (3) The probe for the oscilloscope must be more than  $1M\Omega$  and less than 10pF.
  - (4) The output (H/L level) of **GP1F361R** are not fixed constantly when it receives the disturbing light (including DC light, no input light) less than 0.1Mbps.

**Fig. 6 Measuring Method of Jitter**

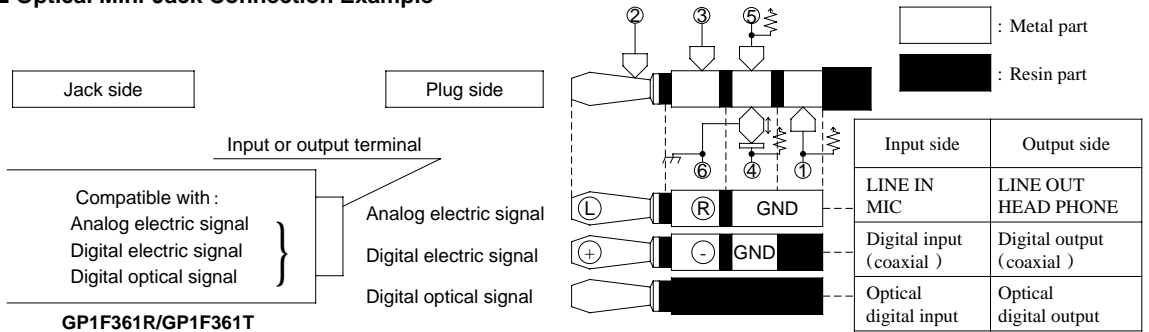


Test item

Test item	Symbol	Test condition
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 fiber coupling light output set at - 14.5dBm/ - 24.0dBm.  
 (2) The waveform write time shall be 3 seconds. But do not allow the waveform to be distorted by increasing the brightness too much.  
 (3)  $V_{CC} = 3.0 \pm 0.05V$  (State of operating)  
 (4) The probe for the oscilloscope must be more than  $1M\Omega$  and less than  $10pF$ .

■ Optical Mini-Jack Connection Example



**GP1F361R/GP1F361T**

Kinds of plug	Output		
	④	⑤	①
Analog electricity	L	L	L
Digital electricity	L	L	H
Digital optics	L	H	H
No plug	H	H	H

- Please refer to the chapter “Precautions for Use.”