

GP1FA512RZ Datasheet



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| | |
|------------------------------|---|
| DiGi Electronics Part Number | GP1FA512RZ-DG |
| Manufacturer | Sharp Microelectronics |
| Manufacturer Product Number | GP1FA512RZ |
| Description | FIBER OPTIC RECEIVER 13.2MBPS |
| Detailed Description | Fiber Optic Receiver Digital Audio 13.2Mbps -24dBm 4.75V ~ 5.25V 25 mA |

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Manufacturer Product Number:

GP1FA512RZ

Series:

-

Data Rate:

13.2Mbps

Power - Minimum Receivable:

-24dBm

Applications:

Digital Audio

Manufacturer:

Sharp Microelectronics

Product Status:

Obsolete

Voltage - Supply:

4.75V ~ 5.25V

Current - Supply:

25 mA

Environmental & Export classification

RoHS Status:

RoHS non-compliant

ECCN:

EAR99

Moisture Sensitivity Level (MSL):

1 (Unlimited)

HTSUS:

8541.49.1050

GP1FA512TZ/ GP1FA512RZ

■ Features

1. Shutter system unnecessary to remove the protection cap
2. Uni-directional data transmission using plastic optical fiber
3. High transfer rate: $T=13.2\text{Mb/s}$
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 ($T_a=25^\circ\text{C}$)

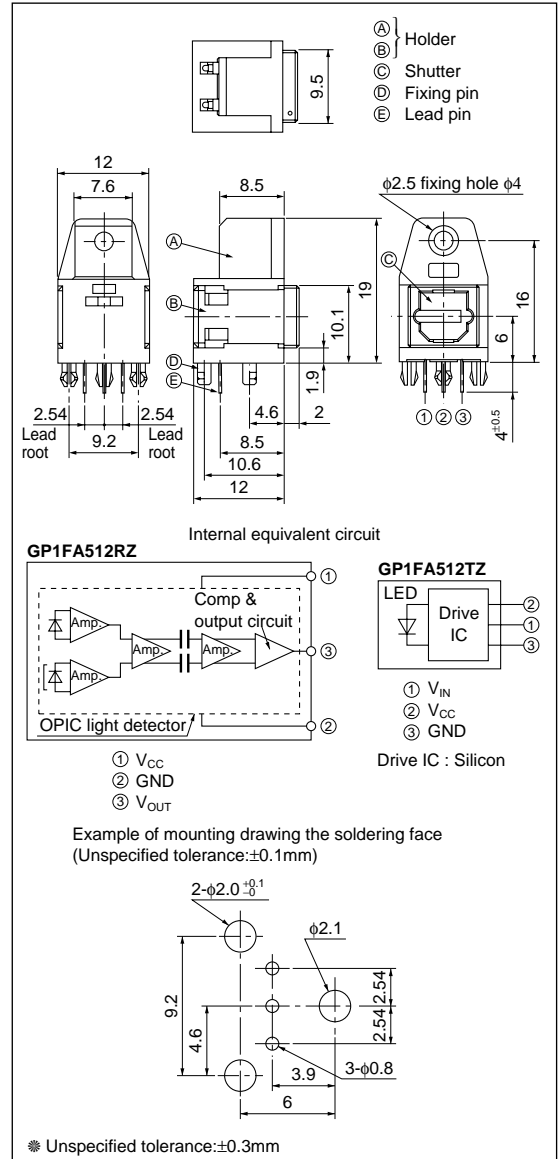
| Parameter | Symbol | Rating | Unit |
|--------------------------------|-----------|----------------------|------------------|
| Supply voltage | V_{CC} | -0.5 to +7.0 | V |
| Output current (GP1FA512RZ) | I_{OH} | 2 (Source current) | mA |
| | I_{OL} | 10 (Sink current) | |
| Input voltage (GP1FA512TZ) | V_{IN} | -0.5 to $V_{CC}+0.5$ | V |
| Operating temperature | T_{opr} | -20 to +70 | $^\circ\text{C}$ |
| Storage temperature | T_{stg} | -30 to +80 | $^\circ\text{C}$ |
| *1 Soldering temperature | T_{sol} | 260 | $^\circ\text{C}$ |

*1 For 5s (2 times or less)

Shutter System 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 (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 receives 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 | λ _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 | Δt _w | Refer to Fig.3 | –15 | – | +15 | ns |
| Jitter | Δt _j | Refer to Fig.3 | – | 1 | 15 | ns |

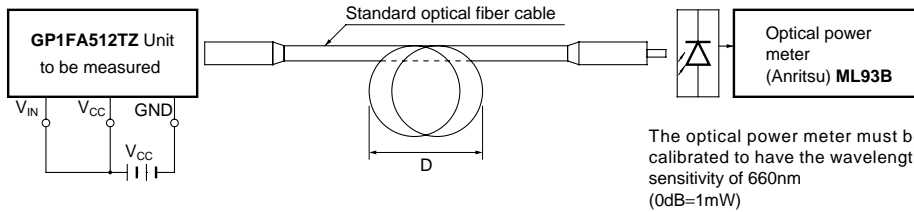
■ Electro-optical Characteristics (GP1FA512RZ) (T_a=25°C, V_{CC}=5V)

| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|-----------------------------|------------------|--|------|------|------|------|
| Peak sensitivity wavelength | λ _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 | Δt _w | Refer to Fig.5 | –20 | – | +20 | ns |
| Jitter | Δt _j | Refer to Fig.6, P _C =–14.5dBm | – | 1 | 15 | ns |
| | | Refer to Fig.6, P _C =–24dBm | – | – | 15 | ns |

■ Mechanical Characteristics

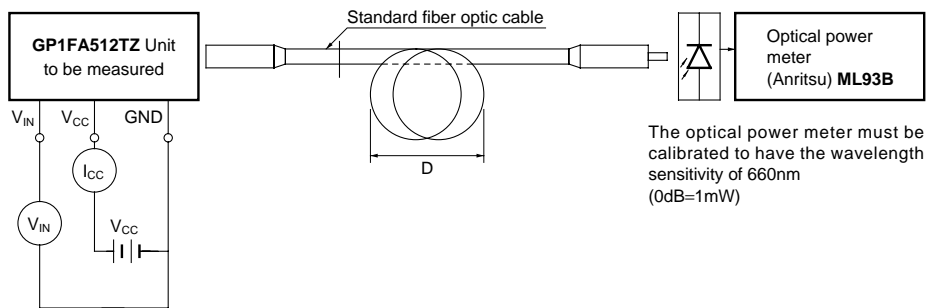
| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|-----------------------------------|--------|--------------------------------------|------|------|------|------|
| Insertion force, withdrawal force | – | Initial value when a GP1C331 is used | 6 | – | 40 | N |

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

Fig.2 Measuring Method of Input Voltage and Supply Current

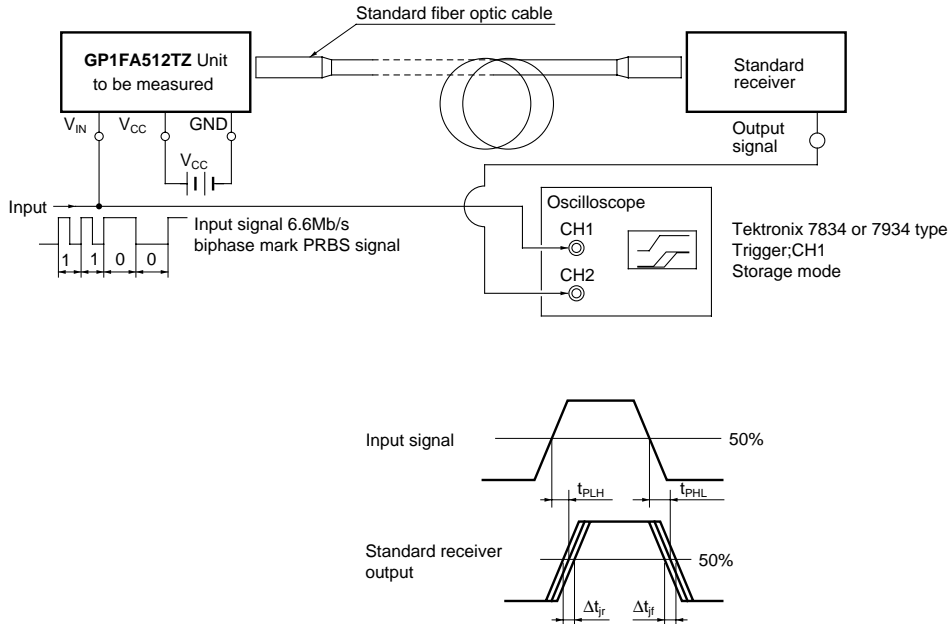


Input conditions and judgement method

| Conditions | Judgement method |
|-----------------------|--|
| $V_{IN}=2.1V$ or more | $-21 \leq P_C \leq -15dBm$, $I_{CC}=13mA$ or less |
| $V_{IN}=0.8V$ or less | $P_C \leq -36dBm$, $I_{CC}=13mA$ 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 | 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_{jl} | 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 | 13.2Mb/s NRZ, Duty 50% or 6.6Mb/s biphasic mark PRBS signal | |

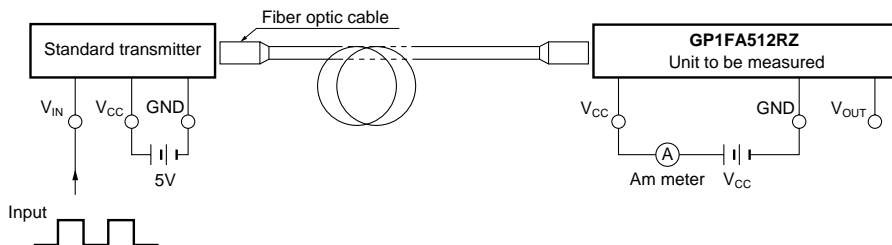
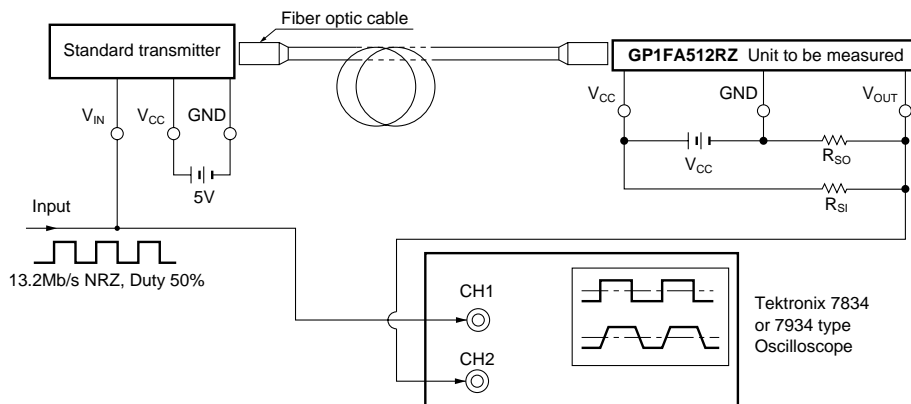


Fig.5 Measuring Method of Output Voltage and Pulse Response



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

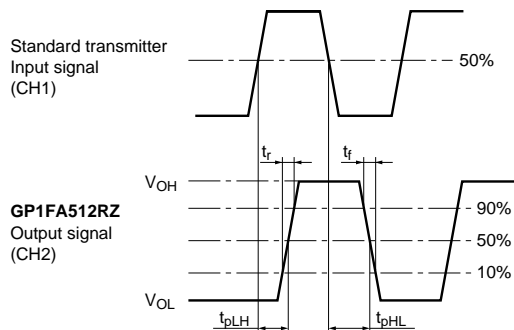
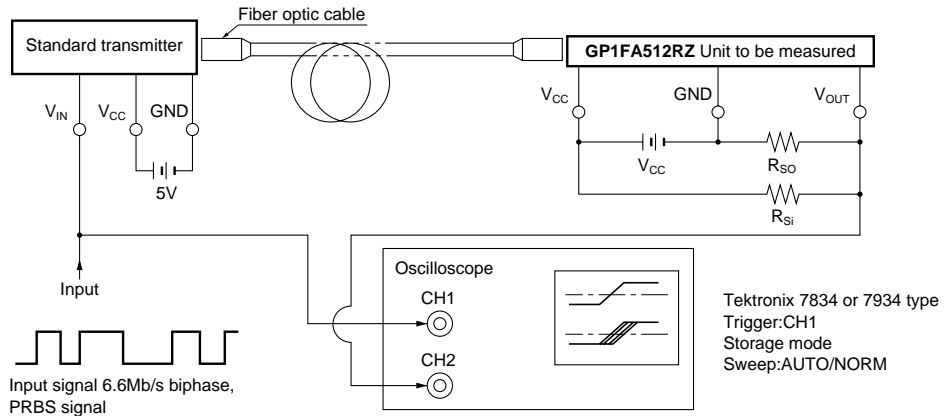


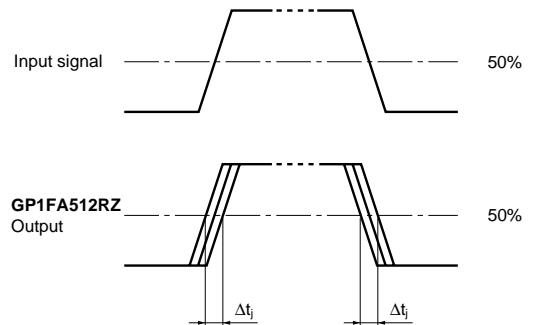
Fig.6 Measuring Method of Jitter



Test item

| Test item | Symbol | Test condition |
|-----------|--------------|---|
| Jitter | 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} : $3.3\text{k}\Omega$, R_{So} : $2.2\text{k}\Omega$)
 - (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 10pF



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