REFERENCE

SPEC No. ED-03G007
ISSUE July 18, 2003

SHARP

OPTO-ELECTRONIC DEVICES DIVISION
ELECTRONIC COMPONENTS GROUP
SHARP CORPORATION

SPECIFICATION

DEVICE SPECIFICATION FOR

Fiber-optic for digital audio interface

MODEL No.

GP1FA513RZ

Specified for

Enclosed please find copies of the Specifications which consists of 11 pages including cover.
After confirmation of the contents, please be sure to send back [2] copies of the Specifications with approving signature on each.

CUSTOMER'S APPROVAL

DATE

BY

PRESENTED

DATE July. 24. 2003

BY H. Ogura

H. Ogura,
Department General Manager of
Engineering Dept., III
Opto-Electronic Devices Div.
ELECOM Group
SHARP CORPORATION

REFERENCE ED-03G007

GP1FA513RZ
July 18, 2003

Product name : Fiber-optic for digital audio interface

Model No. : GP1FA513RZ

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2. When using this product, please observe the absolute maximum ratings and the instructions for use outlined in these specification sheets, as well as the precautions mentioned below. Sharp assumes no responsibility for any damage resulting from use of the product which does not comply with the absolute maximum ratings and the instructions included in these specification sheets, and the precautions mentioned below.

(Precautions)

(1) This product is designed for use in the following application areas ;

(・OA equipment ・Audio visual equipment ・Home appliances
・Telecommunication equipment (Terminal) ・Measuring equipment
・Tooling machines ・Computers ・Amusement machine etc.)

If the use of the product in the above application areas is for equipment listed in paragraphs (2) or (3), please be sure to observe the precautions given in those respective paragraphs.

(2) Appropriate measures, such as fail-safe design and redundant design considering the safety design of the overall system and equipment, should be taken to ensure reliability and safety when this product is used for equipment which demands high reliability and safety in function and precision, such as ;

(・Transportation control and safety equipment (aircraft, train, automobile etc.)
・Traffic signals ・Gas leakage sensor breakers ・Rescue and security equipment
・Other safety equipment etc.)

(3) Please do not use this product for equipment which require extremely high reliability and safety in function and precision, such as ;

(・Space equipment ・Telecommunication equipment (for trunk lines)
・Nuclear power control equipment ・Medical equipment (Related human life) etc.)

(4) Please contact and consult with a Sharp sales representative if there are any questions regarding interpretation of the above three paragraphs.

3. Please contact and consult with a Sharp sales representative for any questions about this product.

1. Application

This specification applies to the outline and characteristics of the fiber-optic receiver unit GP1FA513RZ for digital audio interface.

2. Outline

Refer to the attached drawing No. CY11215i02.

3. Ratings and characteristics

Refer to the attached sheet, Page 4 to 6.

4. Reliability

Refer to the attached sheet, Page 7.

5. Outgoing inspection

Refer to the attached sheet, Page 8.

6. Supplements

6.1 Packing specification

Refer to the attached sheet, Page 10.

6.2 To evaluate the characteristics, the Sharp GP1FA513TZ or its equivalent transmitter shall be used as the standard transmitter and the Sharp GP1C331 (APF,1m) or its equivalent fiber optic cable shall be used as the standard fiber optic cable.

6.3 This product is not designed to protect against electromagnetic waves or heavily charged electric particles.

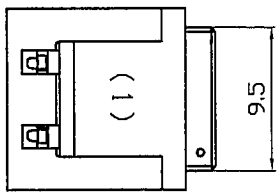
6.4 This product shall not contain the following materials.
Also, the following materials shall not be used in the production process for this product.
Materials for ODS : CFC_S, Halon, Carbon tetrachloride 1.1.1-Trichloroethane (Methyl chloroform)

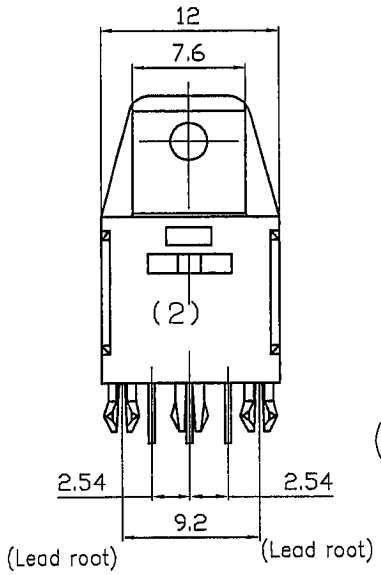
6.5 Product mass : Approx. 3g

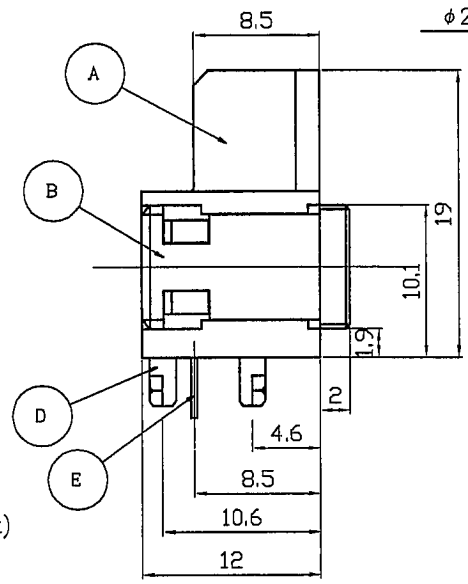
7. Notes

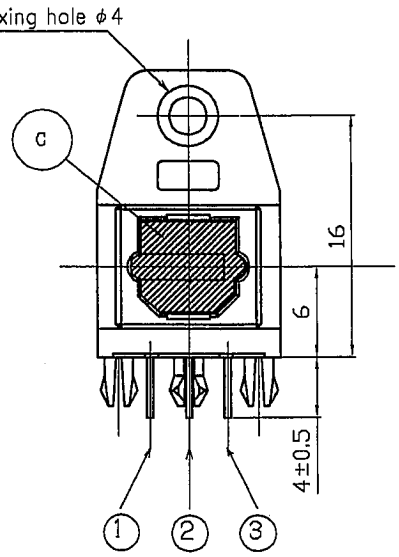
Refer to the attached sheet, Page 9.

Symbol	Description	Material
A	Holder	PBT(color: Black)
B	Holder	ABS(color: Black)
C	Shutter	ABS(color: Black)
D	Fixing pin	PBT(color: Black)
E	Lead pin	Cu Alloy (Solder plating finish)

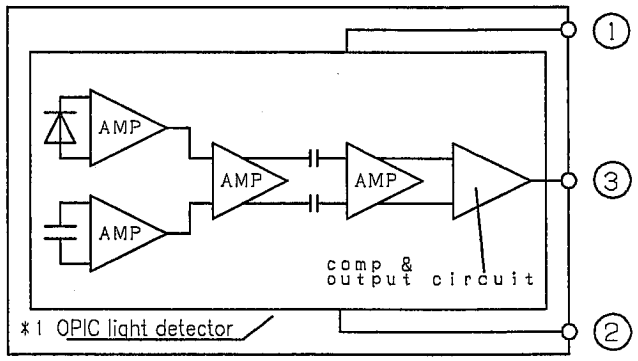








Internal equivalent circuit



*1

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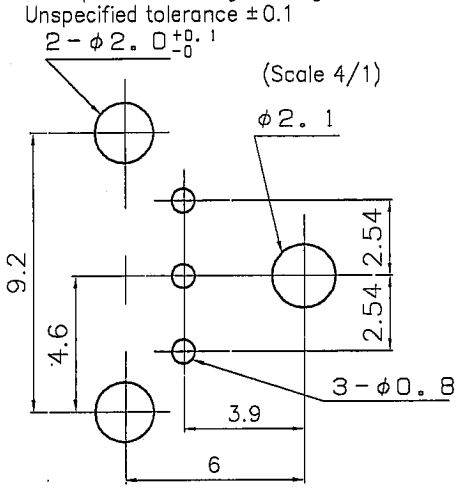
Pin arrangement

① VCC ② GND ③ Vout

Example of mounting drawing from solder side
Unspecified tolerance ±0.1



(2)Portion marking

Production year (Last digit of prod. year)

Production month

Jan. to Sep.: 1~9
Oct.: X
Nov.: Y
Dec.: Z

5 1 3 R

A part of Model No.

4)We have SHARP's products which the shape of fixing pin to PCB is different from this receiver.So,please understand that example of drawing for this receiver.
3)Unspecified tolerance shall be ±0.3.

2) (1)portion:"S"mark (2)portion:A part of Model No. and date code shall be indicated

1)The connector joint area complies with the square connector EIAJ RC-5720B.

SCALE	NAME	GP1FA513RZ Outline Dimensions
2/1		
UNIT		
1 = 1/1 mm	DRAWING No.	CY112151i02

3. Ratings and Characteristics

3.1 Absolute maximum ratings

Parameter	Symbol	Rating	Unit	Remark
Supply voltage	Vcc	-0.5 to +7.0	V	-
Operating temperature	Topr	-20 to 70	℃	-
Storage temperature	Tstg	-30 to 80	℃	-
Soldering temperature	Tsol	260	℃	5s /time up to 2 times
Output current	I_{OH}	2	mA	Source current
	I_{OL}	10	mA	Sink current

3.2 Recommended operating conditions

Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Remark
Supply voltage	Vcc	4.75	5.0	5.25	V	
Operating transfer rate	T	0.1	-	13.2	Mb/s	Notes (1), (2)
Receiver input optical power level	Pc	-24.0	-	-14.5	dBm	Peak optical output

(1) This operating transfer rate shall be a specification when NRZ, duty 50%of continuous " 0101⋯" signal is transferred.

(2) The output (H/L level) of GP1FA513RZ are not fixed constantly when it receivers the modulating light (including DC light, no input light) less than 0.1Mb/s.

3.3 Electro-optical characteristics

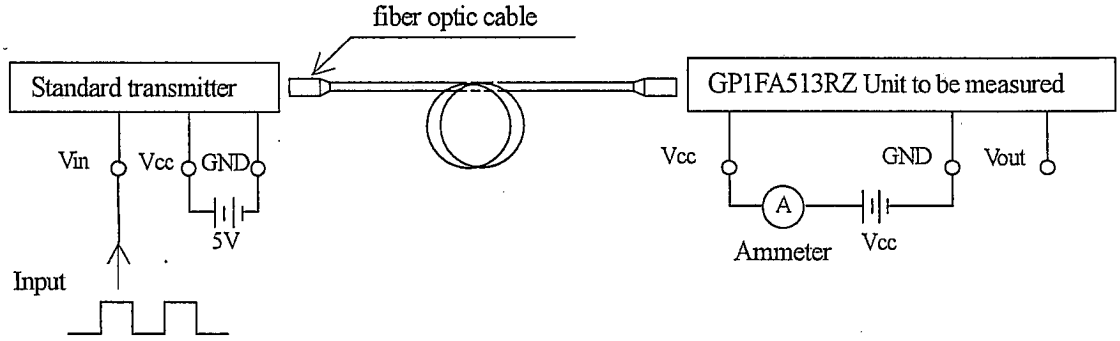
Vcc=5.0V, Ta=25℃

No.	Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
1	Peak sensitivity wavelength	λp	-	-	700	-	nm
2	Supply current	Icc	Measuring method Refer to 3.4.1	-	16	25	mA
3	High level output voltage	VoH	Measuring method Refer to 3.4.2	2.7	3.5	-	V
4	Low level output voltage	VoL		-	0.35	0.5	V
5	Rise time	tr		-	15	23	ns
6	Fall time	tf		-	7	15	ns
7	L→H delay time	tpLH		-	-	180	ns
8	H→L delay time	tpHL		-	-	180	ns
9	Pulse width distortion	Δtw		-20	-	+20	ns
10	Jitter	Δtj	Measuring method Refer to 3.4.3 Pc=-14.5dBm	-	1	15	ns
			Measuring method Refer to 3.4.3 Pc=-24dBm	-	-	15	ns

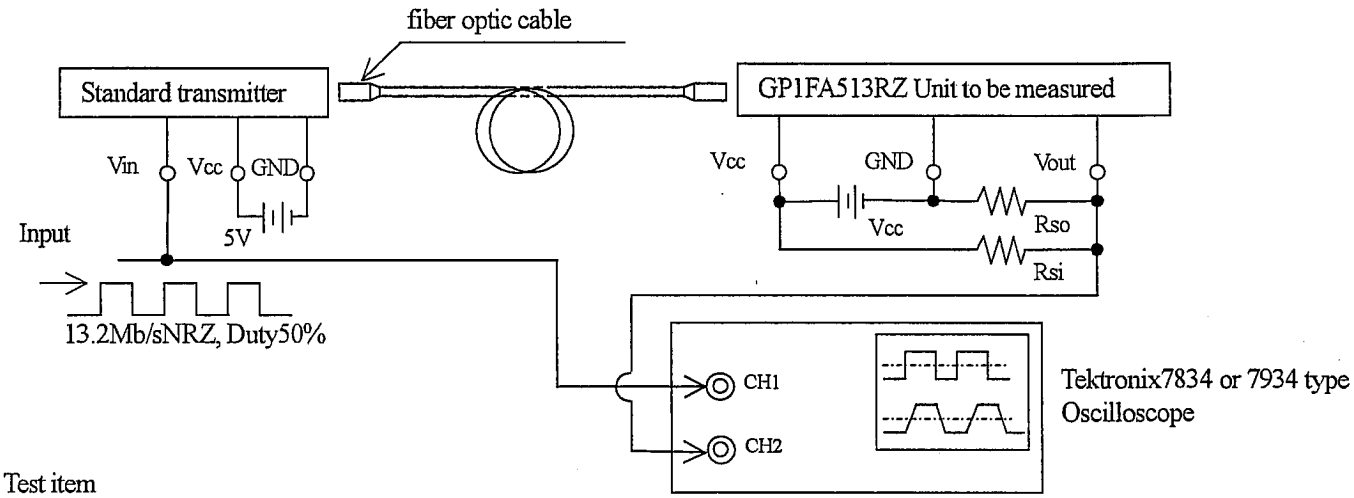
3.4 Measuring method

3.4.1 Supply current

Input conditions		Measuring method
Supply voltage	Vcc=5.0V	Measured on an ammeter (DC mean amperage)
Optical fiber coupling light output	Pc=-14.5dBm	
Standard transmitter input signal	13.2Mb/s NRZ, Duty 50% or 6.6Mb/s biphase mark PRBS signal	

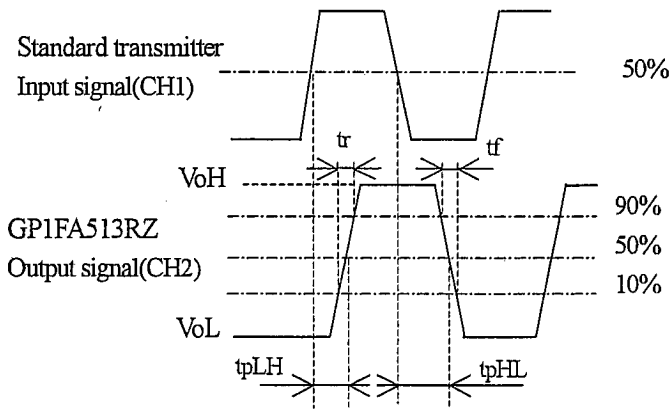


3.4.2 Output voltage and pulse response measuring method



Test item

No.	Test item	Symbol
1	L→H pulse delay time	tpLH
2	H→L pulse delay time	tpHL
3	Rise time	tr
4	Fall time	tf
5	Pulse width distortion Δtw=tpHL-tpLH	Δtw
6	High level output voltage	VoH
7	Low level output voltage	VoL



Notes

(1) Vcc=5.0V (State of operating)

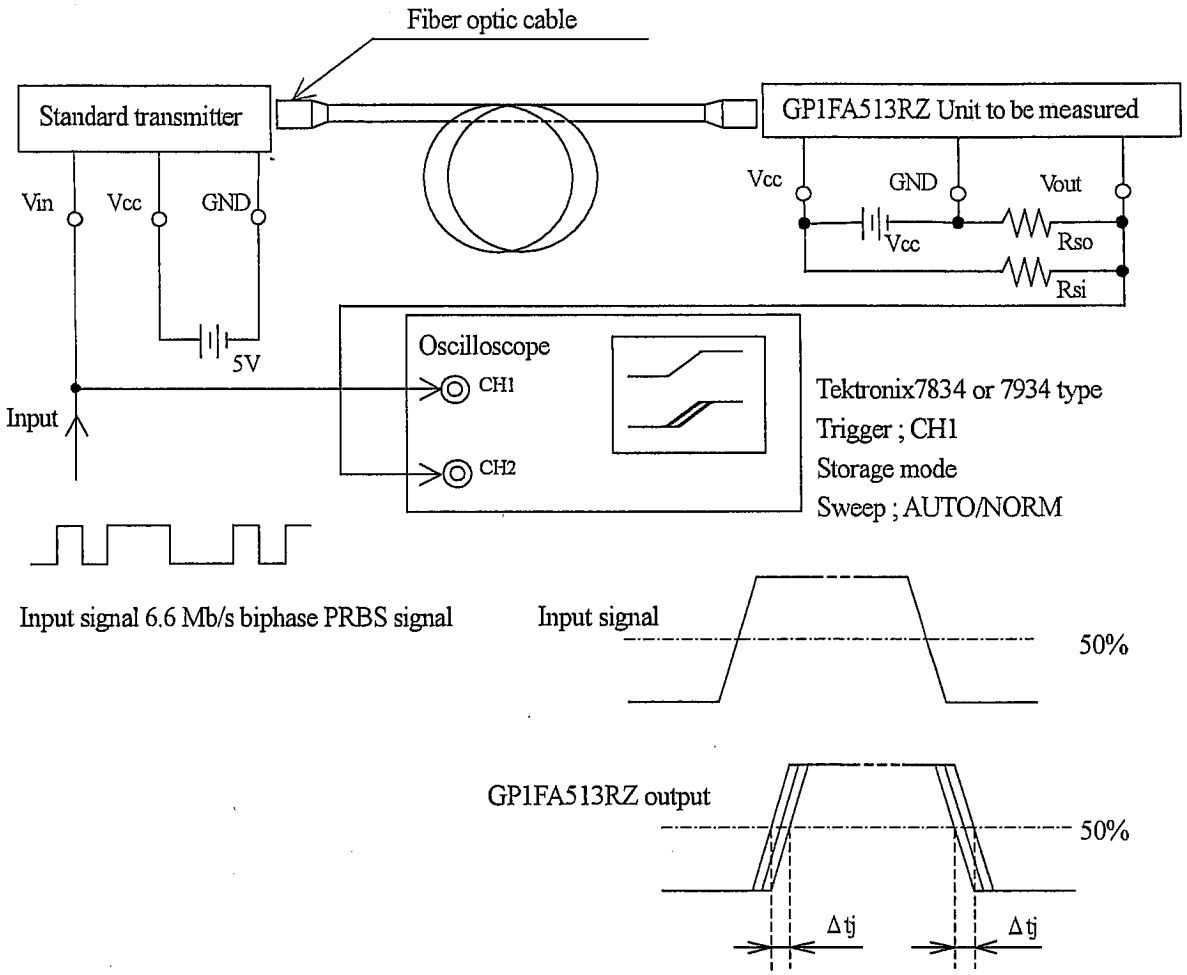
(2) The fiber coupling light output set at -14.5dBm or -24.0dBm.

(3) The probe for the oscilloscope must be more than 1MΩ and less than 10pF.

(4) Rsi, Rso : Standard load resistor(Rsi : 3.3kΩ, Rso : 2.2kΩ)

(5) The output (H/L level) of GP1FA513RZ are not fixed constantly when it receives the modulating light (including DC light, no input light) less than 0.1Mb/s.

3.4.3 Measuring method of pulse response and Jitter



Test item

No.	Test item	Symbol	Test conditions
1	Jitter	Δtj	Set the trigger on the rise of input signal to measure the jitter of the rise of output.
2	Jitter	Δtj	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 or -24.0dBm.
(2) Rsi, Rso : Standard load resistor(Rsi : 3.3kΩ, Rso : 2.2kΩ)
(3) Set the oscilloscope to the storage mode and write time to 3 seconds.
Do not allow the brightness to be increased too much.
The wave-form would be distorted.
(4) Vcc=5.0V (State of operating)
(5) The probe for the oscilloscope must be more than 1MΩ and less than 10pF.

3.5 Mechanical characteristics

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

4. Reliability

The reliability of products shall satisfy items listed below.

Confidence level : 90%

LTPD : 10 or 20

No.	Test Items	Test Conditions	Failure Judgement Criteria	Samples (n) / Defective(C)
1	High temp. and high humidity storage	Ta=40℃,90%RH, 500h	Failure judgement criteria of each characteristics given in 3.3 No. 2 to 10 must be the following range. No. 2 to 8, 10 U×1.2 or more L×0.8 or less No. 9 U×1.2 or more L×1.2 or less U: Upper specification limit L: Lower limit specification	n=22, C=0
2	High temp. storage	Ta=80℃, 500h		n=22, C=0
3	Low temp. storage	Ta=-30℃, 500h		n=22, C=0
4	Temperature cycling	Ta=-30℃ to +80℃ (30min) (30min) 20 cycles test		n=22, C=0
5	High temp. operation life	Ta=60℃, Vcc=5V applying, 500h		n=22, C=0
6	Soldering heat	Ta=260℃, 5 s/2 times		n=11, C=0
7	Terminal strength (Tension)	Weight : 5N 30 s/each terminal		n=11, C=0
8	Terminal strength (Bending)	Weight : 2.5N, 0° →90° →0° 2 times/each terminal		n=11, C=0
9	Shock	1000m/s^2, Pulse width: 6ms X, Y, Z/3 times each		n=11, C=0
10	Vibration	Frequency range: 10 to 55Hz/sweep 1min Overall amplitude: 1.5mm X, Y, Z/2h each		n=11, C=0
11	Repeated operation	500 times (Fiber optic cable GP1C331 used)	Insertion force≧40N 4N≧withdrawal force 40N≦withdrawal force	n=11, C=0
12	Repeat open/close operation of shutter	1000 times (Fiber optic cable GP1C331 used)	※1	n=11, C=0

※1 Shutter open/close function shall be no trouble. Shutter shall be no damage.

4.1 Measurement conditions

In the test 1 to 6 above, to measure the characteristics, leave 2h at normal temperature and humidity after being tested.

5. Outgoing inspection

(1) Inspection lot

Inspection shall be carried out per each delivery lot.

(2) Inspection method

A single sampling plan, normal inspection level II based on ISO 2859 shall be adopted.

Parameter		Inspection items	AQL(%)
Major defect	1	Satisfies electro-optical characteristics in parameter 3.3 (No.2 to 10).	0.4
	2	It should have no disconnection of lead terminal and case terminal. It should have no dust and solder that would hinder PCB insertion.	
	3	Free from foreign matter on the connector coupling portion that would hinder plug insertion.	
Minor defect	1	Deformation of case and lead terminal (Satisfying outline dimensions of parameter 2)	1.5
	2	Stamp (It should be possible to read stamp of parameter 2. Stamp should be indicated at fixed position.)	

7. Notes

(1) Steadiness of power supply line

Connect a by-pass capacitor (0.1 μ F) of one piece per one element close to the GP1FA513RZ within 7mm of the unit lead terminal. (And connect a 4.7 μ F capacitor of one piece per one element across the power supply line.)

(2) Soldering condition

No more than two times of less than 5 seconds each at soldering temperatures not exceeding 260℃.
Check your soldering condition damaged device and do not getting stress in the lead terminal in case of using soldering rod.
In case of using flow soldering, please make sure of the conditions of process at the flow equipment.
(Solder at a position more than 1.6mm away from the base of the lead terminal.)
Please don't do soldering by reflow.

(3) About getting dirt and dust in the connector portion

Dirt and dust in the connector junction portion, if any, must be blown off by a blower opening with shutter portion.
Do not insert any rigid rod-like object into the connector junction.
The device inside might get damaged resulting deteriorated characteristics.

(4) Cleaning.

Do not immerse when cleaning. The solvent would get into the connector coupling portion resulting deteriorated characteristics.
Should it be necessary to remove the flux, use one of the following solvents only to be applied with a brush.
Solvent ··· Isopropyl alcohol, Methyl alcohol

(5) Ground during assembling

The human body and the soldering rod must be grounded against the static breakdown of the IC during assembling.
Avoid as much as possible touching the IC terminals before assembling.

(6) Fixing product

Please fix this device with M3.0 screw. In case that this device is not fixed fully,
there is the possibility that characteristics deteriorates by stress to be given to internal device and lead wire portion
when connector detaching. The tightening torque of M3.0 screw for fixing this device shall be 0.25 to 0.4N・m.
However, in case of fixing with screw, Please confirm the limit of fixing strength to the fixed object before fixing actually.
In case of fixing the device with screw by screwdriver etc., if excessive force
by screwdriver etc. is applied to the holder or internal devices, the performance might fall down. Please be careful at work.
(ref : the force applied by driver etc. shall be 39N or less for safety.)

(7) Input signal

This receiver is designed intentionally based upon the signal transmission
which is defined by the digital audio interface standard ; CP-1201.
When signal out of EIAJ standard CP-1201 is inputted to this receiver,
there are cases that this receiver can not transmit normally signal to transmitting unit.

(8) Fixing pin

Therefore, please design PCB with reference to the example of mounting hole
for this receiver shown in outline dimensions.

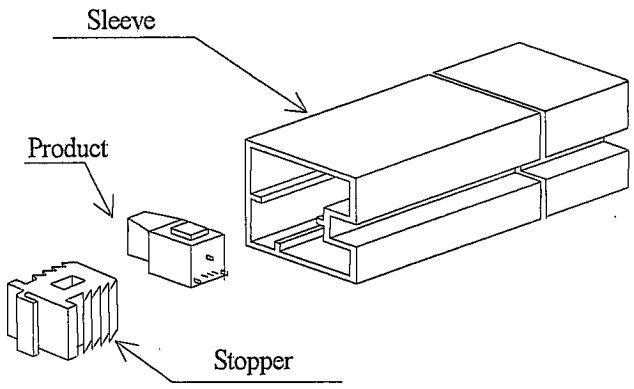
(9) Deformation of connector coupling portion

Please take care for force provided to connector coupling portion of this receiver,
such as deformation of connector coupling portion.
Because there are cases that shutter window can't open and shut in normally.

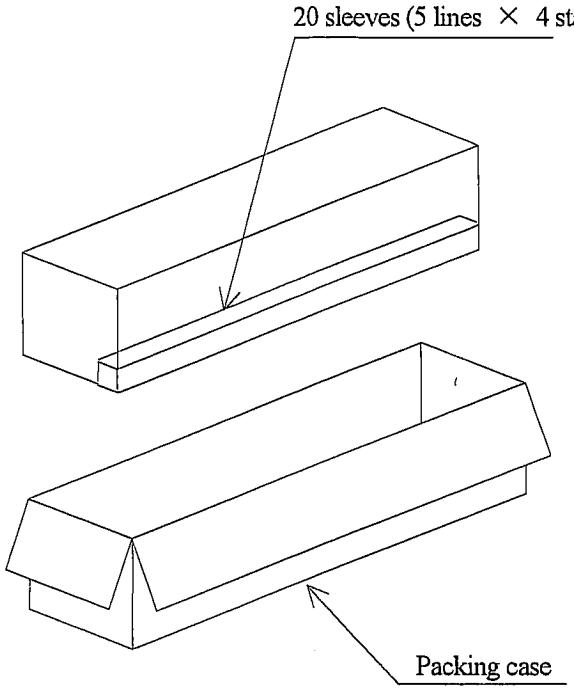
(10) About getting the solvent into connector coupling portion

Please do not get the solvent into connector coupling portion of this receiver.
Because there are cases that the characteristics deteriorated and the shutter window can't open and shut in normally.

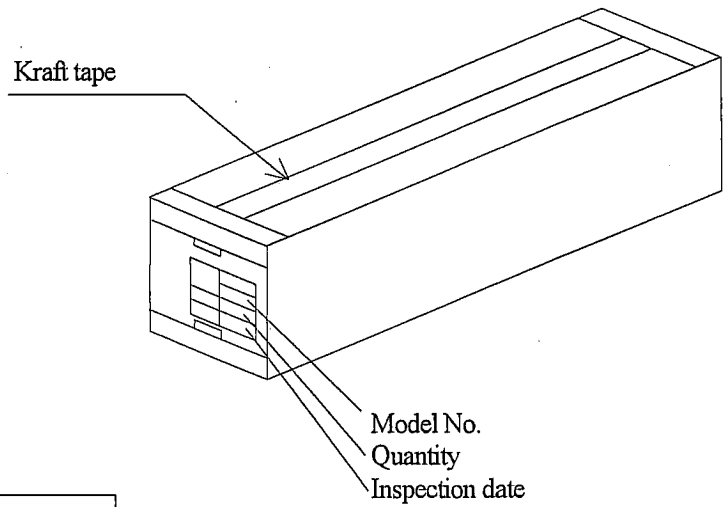
Package drawings



(Fig. 1)



(Fig. 2)



(Fig. 3)

Parts name	Material
Sleeve	HIPS with preventing static electricity
Stopper	Styrene butadiene rubber 45
Packing case	Corrugated cardboard

Packaging method

1. Products of appointed quantity shall be packaged in a sleeve and both of sleeve edge shall be fixed by stopper. Fig. 1
   (GP1FA513RZ : 50 pcs.)
2. 20 sleeves shall be packaged in a packing case. Fig. 2
3. Fix the packing case by craft tape, and fill in the blanks of Model No., Quantity and Inspection date. Fig. 3
   (Quantity per a packing case : 1000pcs.)
   Formal packaged mass : Approximately 5.4kg