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		DATE	2010. 05. 20
PART NAME	FIBER OPTIC MODULE	MODEL NAME	
PART No.		TYPE No.	RFT-4112SS

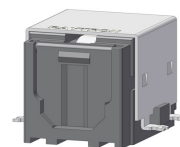
**1. Application**

This specification applies to the outlines of the fiber-optic Transmitter unit for Digital audio Interface

- DVD players
- CD players
- PC-sound card
- Digital TV
- Set top box

**2. Description**

The opto-electrical component is assembled with AlGaInP LED And a driver IC. It Transforms the electrical signal to optical signal and be transmitted by plastic optical fiber. The component is operated at free Voltage and has good performance at low dissipation,Current, steady Light output and efficient light coupling.



**3. Features**

- Wide Supply Voltage : 2.7 ~ 5.5V
- High Thermal Resistance Housing case.
- High speed transmission of high quality audio signal such as DVD players and AV amplifiers.  
signal transmission speed : 25Mbps Max. (NRZ signal)
- Low jitter ( $\Delta t_j$  : 1ns typ.)
- Directly connectable to modulation IC for digital audio equipment.
- Uni-directional data transmission using plastic optical fiber cable.

**4. Absolute Maximum Rating**

- Supply Voltage : -0.5 ~ +7.0V
- Input Voltage : -0.5 ~ Vcc+0.5V
- Operating Temperature : -20°C ~ +70°C
- Storage Temperature : -30°C ~ +80°C
- Soldering Temperature : 260°C

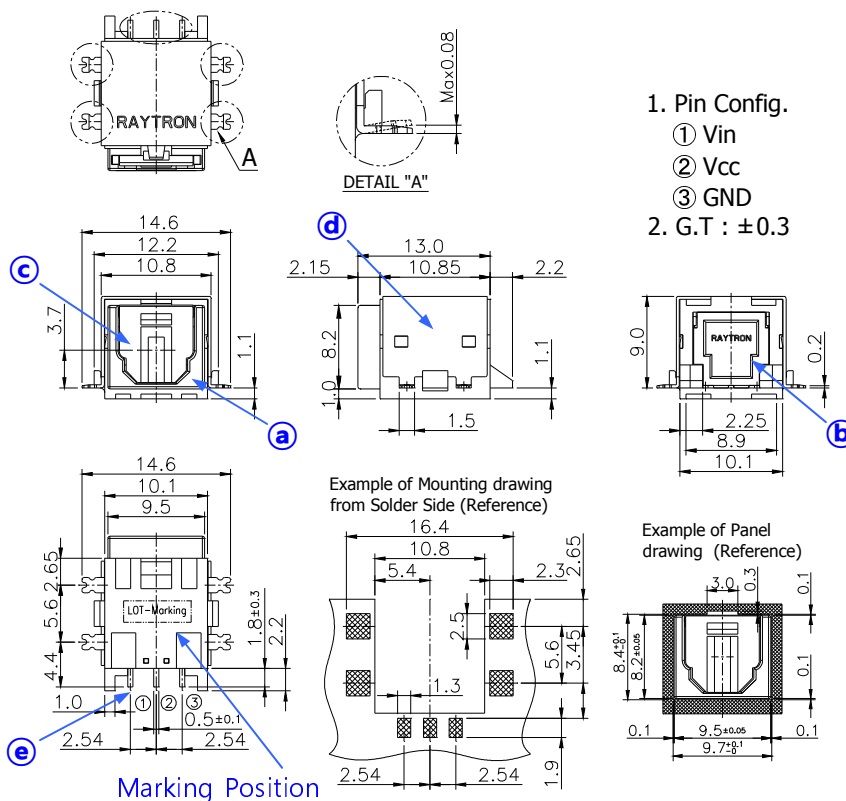
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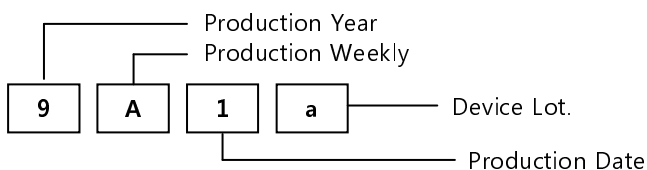
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## 5. Appearance & Dimensions

1) Package Dimension (Unit : mm)



2) Marking Position



3) Material List

Symbol	Description	Material
Ⓐ	Main Body	PA9T (Color : Black)
Ⓑ	Back Cover	PA9T (Color : Black)
Ⓒ	Shutter	PA9T (Color : Black)
Ⓓ	Fixing Guide	Iron (Sn Plating)
Ⓔ	Lead pin	Cu Alloy (Ag Plating)



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### 6. Electro-Optical Characteristics

1) Absolute Maximum Rating (at 25°C Unless otherwise note)

Parameter	Symbol	Ratings	Unit
Supply Voltage	V <sub>CC</sub>	-0.5 ~ +7.0	V
Input Voltage	V <sub>IN</sub>	-0.5 ~ V <sub>CC</sub> +0.5	V
Operating Temperature	Topr.	-20 ~ +70	°C
Storage Temperature	Tstg.	-30 ~ +80	°C
Soldering Temperature (※1)	Tsol	260	°C

(※1) 6s or less / time up to 2times

2) Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Supply Voltage	V <sub>CC</sub>	2.7	5.0	5.5	V	
Operating Transfer Rate	F <sub>DATA</sub>	-	-	25	Mb/s	NRZ Signal, Duty50%
High Level Input Voltage	V <sub>IH</sub>	2.0	-	-	V	V <sub>CC</sub> =5.0V
Low Level Input Voltage	V <sub>IL</sub>	-	-	0.8	V	V <sub>CC</sub> =5.0V

3) Electro - Optical Characteristics (Ta=25°C) (V<sub>CC</sub>=5.0V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Peak Emission Wavelength	λ <sub>P</sub>	630	660	690	nm	
Optical Power Output Coupling with Fiber (※1)	P <sub>C</sub>	-21	-17	-14	dBm	Ref. to Fig.1
Supply Current	I <sub>CC</sub>	-	4	8	mA	Ref. to Fig.2
L → H delay Time	T <sub>PLH</sub>	-	-	100	ns	Ref. to Fig.3
H → L delay Time	T <sub>PHL</sub>	-	-	100	ns	Ref. to Fig.3
Pulse Width Distortion	Δtw	-15	-	+15	ns	Ref. to Fig.3
Jitter of Output Current	Δtj	-	1	15	ns	Ref. to Fig.4

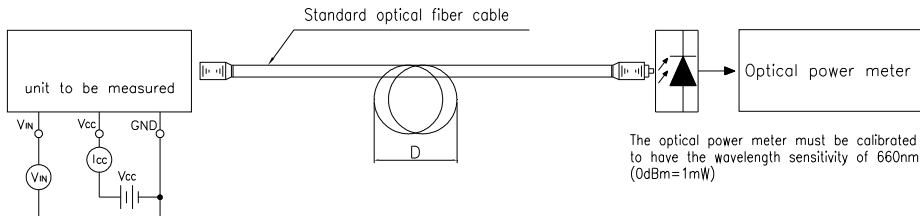
(※ 1) Measure with a standard optical fiber, Peak value.

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4) Measurement Conditions

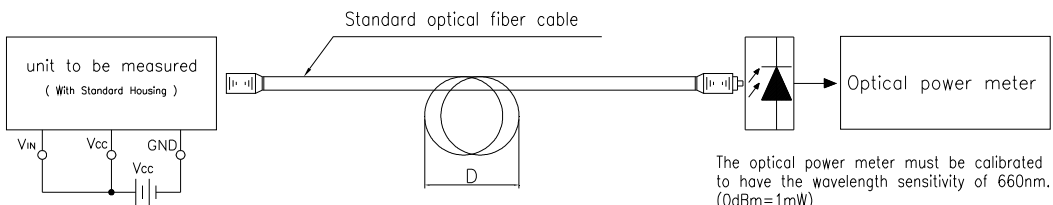
① Fig.1 Measuring Method of Optical output coupling with Fiber



Notes (1)  $V_{cc}=5.0\pm 0.05V$  (ON-state)

The optical power meter must be calibrated to have the wavelength sensitivity of 660nm. (0dBm=1mW)

② Fig.2 Measuring Method of Dissipation Current / Input Voltage



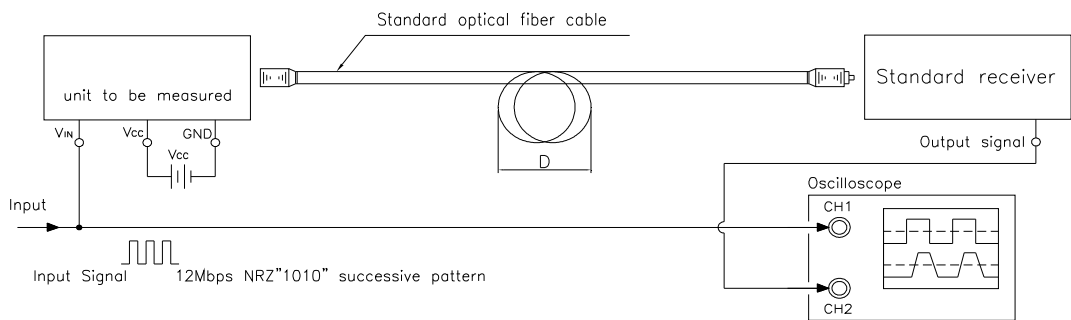
Notes (1)  $V_{cc}=5.0\pm 0.05V$  (Operating)

(2) To bundle up the standard fiber cable, make it into a loop with the diameter(D) of 10cm or more.

The optical power meter must be calibrated to have the wavelength sensitivity of 660nm. (0dBm=1mW)

Parameter	Conditions	Judgement Method
$V_{IH}$	$V_{IN} = 2.0V$ or more	$-21 \leq PC \leq -14$ dBm , $I_{cc} = 8mA$ or less
$V_{IL}$	$V_{IN} = 0.8V$ or less	$PC \leq -36$ dBm , $I_{cc} = 8mA$ or less

③ Fig.3 Measuring Method of Pulse Response



Input Signal 12Mbps NRZ "1010" successive pattern

Input (CH1) 50%

Output (CH2) 50%

$t_{ris}$   $t_{fal}$

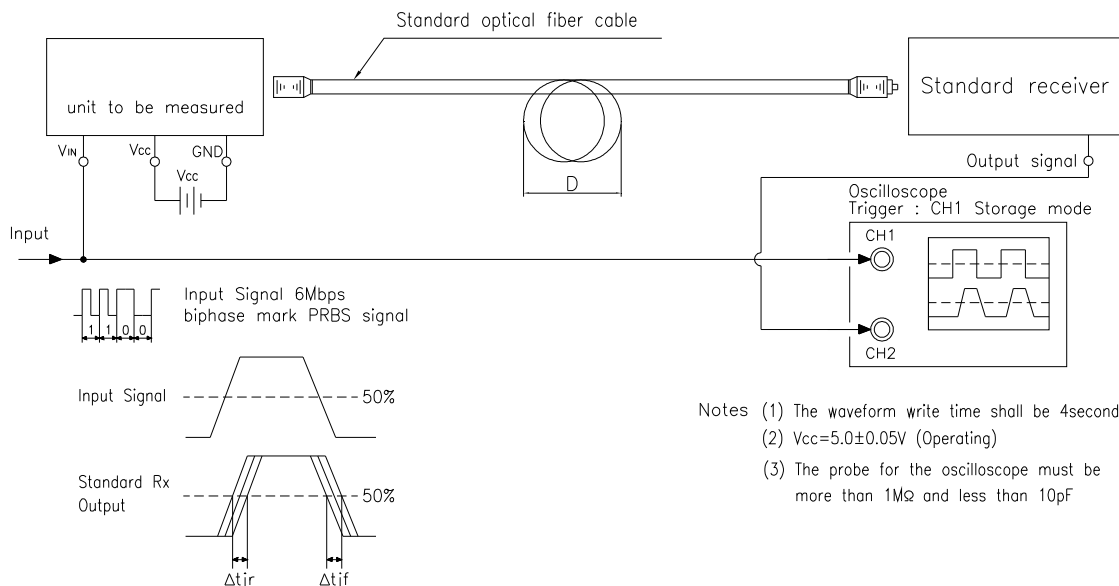
$\Delta tw(\text{Pulse width distortion}) = t_{fals} - t_{ris}$

Notes (1)  $V_{cc}=5.0\pm 0.05V$  (Operating)  
 (2) The probe for the oscilloscope must be more than 1MΩ and less than 10pF

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④ Fig.4 Measuring Method of Dissipation Current / Input Voltage



Parameter	Symbol	Test Conditions
Low → High Pulse Delay Time	T <sub>PLH</sub>	Refer to the above prescriptions
High → Low Pulse Delay Time	T <sub>PHL</sub>	Refer to the above prescriptions
Pulse width Distortion	Δtw	Δtw = T <sub>PHL</sub> -T <sub>PLH</sub>
Low → High Jitter	Δtjr	Set the trigger on the rise of input signal to measure the jitter of the rise of output
High → Low Jitter	Δtjf	Set the trigger on the fall of input signal to measure the jitter of the fall of output

※ Note

- Standard of operating : Vcc=5.0V±0.05V.
- Input signal : 6.6Mbps Bi-phase PRBS V<sub>IH</sub>>=2.0V, V<sub>IL</sub><=0.8V, tr, tf<=5ns.
- Standard fiber optical cable (POF, 1m)
- To bundle up the standard fiber cable, make it into a loop with the diameter of 10cm or more.
- At measure jitter, set the oscilloscope to the storage mode and write time to 4 seconds.

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**7. Reliability Test Item and Standard.**

- 1) All output products shall satisfy below Reliability test items.
- 2) Related sampling quantity and acceptance/failure judgment standard accordance with MIL standard MIL-STD-883 is as listed below.

① Confidence level : 90%

② LTPD : 10% / 20%

No	Test Items	Test Conditions	Failure Judgement	Samples(n)
				Defective(c)
1	High temp. and High humidity Operating	Ta= +85°C 85% RH /500h Vcc=5 V applying	Failure judgment criteria Of each characteristics Given in 1 to6 Must be with The Following range.  1) Pc Brightness attenuate Difference : 20% less  2) Icc Current attenuate Difference : 20% less  3) Tr Time attenuate Difference : 20% less  3) Tf Time attenuate Difference : 20% less	n=22, C=0
2	High temp. Storage (※2)	Ta= +85°C/500h		n=22, C=0
3	Low temp. Storage (※2)	Ta= -30°C/500h		n=22, C=0
4	Temperature Cycling (※2) (※3)	Ta= -20°C to +85°C (30min/30min) 20 Cycle test		n=22, C=0
5	Room temp. Operation life	Ta= +25°C Vcc= 5V applying 500h		n=22, C=0
6	Soldering heat (※4)	Tsol = 260°C ± 5°C, 5 sec		n=11, C=0

※1. Supply voltage of load test is 5V.(Standard Jig of Raytron)

※2. Electro-optical characteristics shall be satisfied after leaving 2 hours in the normal condition.

※3. Temperature cycle test shall repeat above condition 20 times under no load.

※4. For 5sec (after mounting on PCB with thickness of 1.6mm)

☞ In cased any trouble or question arises related to above test items, both parties agree to make full discussion and covering the said matters.

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**8. Mechanical Characteristics**

Parameter	Min.	Typ.	Max.	Unit	Conditions
Insertion force, Withdrawal force	0.8	-	4	kg	Initial value when STD-Fiber optic Cable used

**9. 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 ISO2859 shall be adopted.

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

**10. Soldering Condition**

- 1) The distance between holes should be the same as that of between terminal leads of the component to avoid any stress during the soldering process.  
This may lead to the open circuit. Also, lead forming should be done before soldering process not to apply any stress to the inside of the epoxy resin.
- 2) Not to apply any stress to the component during the soldering process.
- 3) Recommended soldering condition.

Item	Conditions
Pre-heating & Solder Bath	- Pre-heating : Less than 90°C - Solder Bath : 260°C - Soldering Area : 3mm away from the bottom the epoxy resin - Dip time : Less than 5seconds. Less than twice.
Soldering - Iron	- Temperature : Less than 350°C, within 3 seconds.

- ※ Note
1. Not to apply high temperature exceeding the maximum storage temperature to the epoxy resin.
  2. Not to apply any force to the epoxy resin at high temperature.

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4) Washing  
 Some chemicals may damage the epoxy resin.  
 Ethyl-alcohol is recommended under the following condition.

Chemical washing	* Temperature : Less than 45°C * Wash time : Less than 3 minutes
Ultrasound washing	* Power : Less than 15W * Wash time : Less than 3 minutes

### 11. Notice

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    - . Office automation equipment [ terminal ]
    - . Telecommunication equipment
    - . Test and measurement equipment
    - . Industrial control
    - . Audio visual equipment
    - . Consumer electronics

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- ② Measures such as fail-safe function and redundant design should be taken to ensure reliability and safety when RAYTRON devices are used for or in connection with equipment that requires higher reliability such as :
- Transportation control and safety equipment (aircraft, trains, automobiles, etc.)
  - Traffic signals
  - Gas leakage sensor breakers
  - Alarm equipment
  - Various safety devices, etc.
- ③ RAYTRON devices shall not be used for or in connection with equipment that requires an extremely high level of reliability and safety such as :
- Space application
  - Telecommunication equipment
  - Nuclear power control equipment
  - Medical and other life support equipment.
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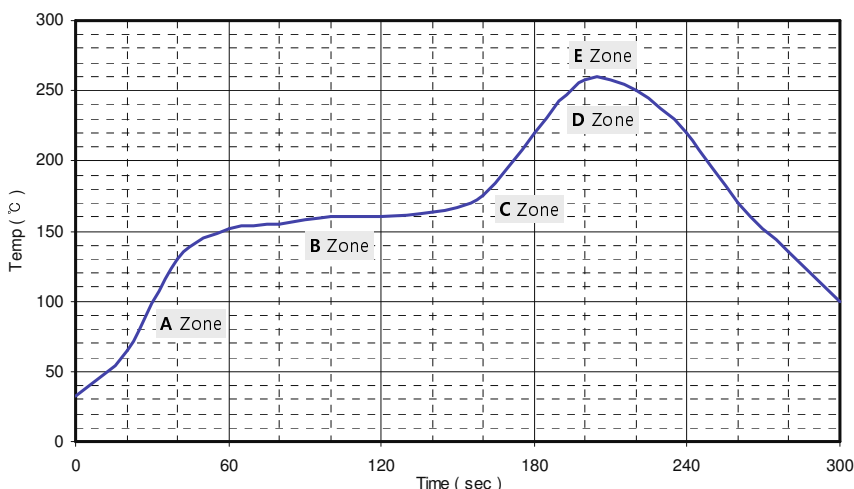
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## 12. Precautions to be taken on mounting

### 1) Reflow Soldering

- ① Following soldering paste recommended.
  - Melting temperature : 245 ~ 260°C
  - Composition : Pb-Free
- ② Recommended thickness of metal mask is between 0.2mm and 0.25mm for screen printing.
- ③ The below illustrated temperature profile at the top surface of the product is requested for soldering.



Zone	Time	Temperature
A	70 ~ 100sec	4°C/s max.
B	60 ~ 120sec	140 ~ 160°C
C	50 ~ 70sec	4°C/s max.
D	60sec max.	210 ~ 230°C
E	10sec max.	260°C max.

Reflow System : Japan pulse Laboratories Inc.(RF-430)  
Temp. Profile : SEF Eltronic GmbH (Mesh 3.0)

### 2) Manual Soldering

- ① Use the Pb-Free solder or the solder containing silver.
- ② Use a soldering iron of 25W or smaller.  
Adjust the temperature of the soldering iron below 270°C
- ③ Finish soldering within 3 seconds.
- ④ Handle products only after the temperature is cooled off.

### 3) Mounting Precautions

- ① Do not apply stress to the resin at high temperature.
- ② The resin part is easily scratched, so avoid friction with hard materials.
- ③ When installing the assembly board in equipment, ensure that this product does not come into contact with other components.

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