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Sensor Innovator  
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# *Fiber Optic Modules for Digital Data-Link Systems*



**raytron**

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## 1. Description

The RFT-series are Fiber Optic Transmitting modules for data link interface and Digital Audio Equipment, integrate LED and Driver IC with constant current output.

## 2. Applications

- 1) Digital optical Data-Link.
- 2) AV instruments (TV, Audio, CD player, STB, etc)
- 3) Home appliances (PC, Notebook, etc)
- 4) Sound card.

## 3. Features

- 1) Wide operating supply voltage between 2.7V to 5.5V.
- 2) High speed transmission of high quality audio signal such as DVD players and AV amplifiers.
- 3) Signal transmission speed : 25Mbps Max.(NRZ Signal)
- 4) Directly connectable to modulation IC for digital audio equipment.
- 5) TTL compatible interface.
- 6) RoHS compliant component.



## 4. 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 to +7.0	V
Input Voltage	V <sub>IN</sub>	-0.5 ~ V <sub>CC</sub> +0.5	V
Operating Temperature	T <sub>opr.</sub>	-20 ~ +70	°C
Storage Temperature	T <sub>stg.</sub>	-30 ~ +80	°C
ESD Protection Voltage (HBM)	V	5,000	V
Soldering Temperature (*1)	T <sub>sol</sub>	245±5, t<10sec	°C

(\*1) For 10sec (at mounting on PCB with thickness of 1.2mm), less than twice.

### 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	T	-	13.2	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

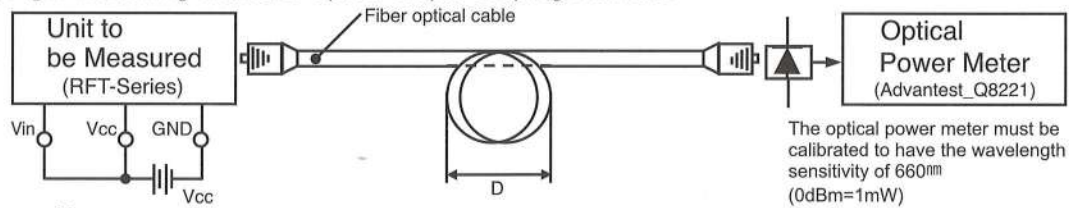
(Ta=25°C) (Vcc=5.0V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Peak Emission Wavelength	$\lambda_P$	630	660	690	nm	
Optical Power Output Coupling with Fiber (※1)	$P_C$	-21	-17	-14	dBm	Ref. to Fig.1
Supply Current	$I_{CC}$	-	4	8	mA	Ref. to Fig.2
Rise Time	$t_r$	-	9	30	ns	Ref. to Fig.3
Fall Time	$t_f$	-	10	30	ns	Ref. to Fig.3
L → H delay Time	$t_{PLH}$	-	30	100	ns	Ref. to Fig.4
H → L delay Time	$t_{PLH}$	-	30	100	ns	Ref. to Fig.4
Pulse Width Distortion	$\Delta tw$	-15	-	+15	ns	Ref. to Fig.4
Jitter of Output Current	$\Delta tj$	-	1	15	ns	Ref. to Fig.4

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

### 4) Measurement Conditions

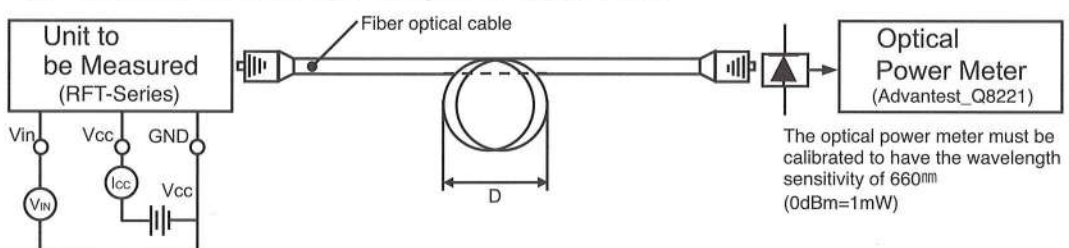
① Fig.1 Measuring Method of Optical Output Coupling with Fiber



※ Note

1.  $V_{CC} = 5.0V$
2. To bundle up the standard fiber cable, make it into a loop with the diameter(D) of 10cm or more.

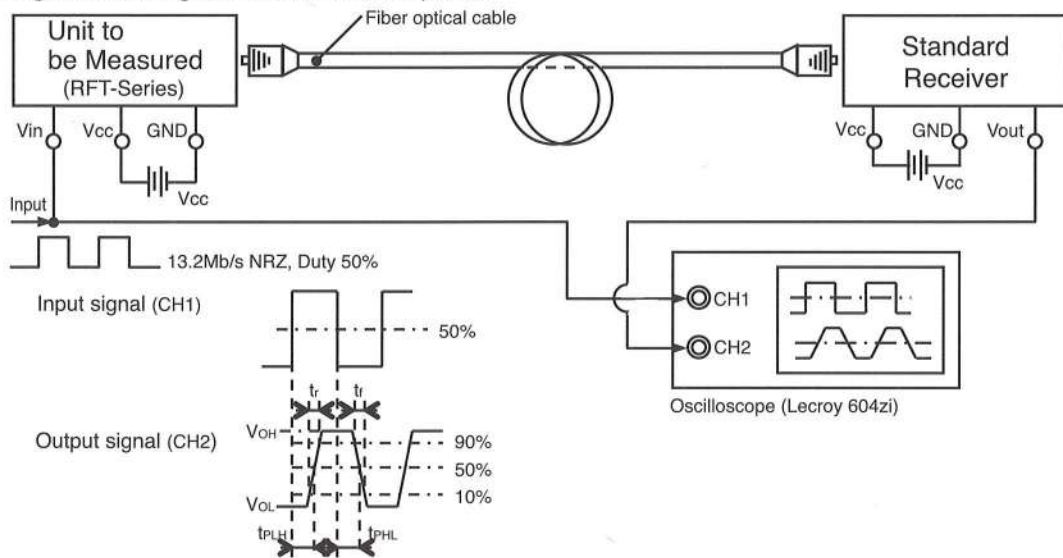
② Fig.2 Measuring Method of Input Voltage and Supply Current



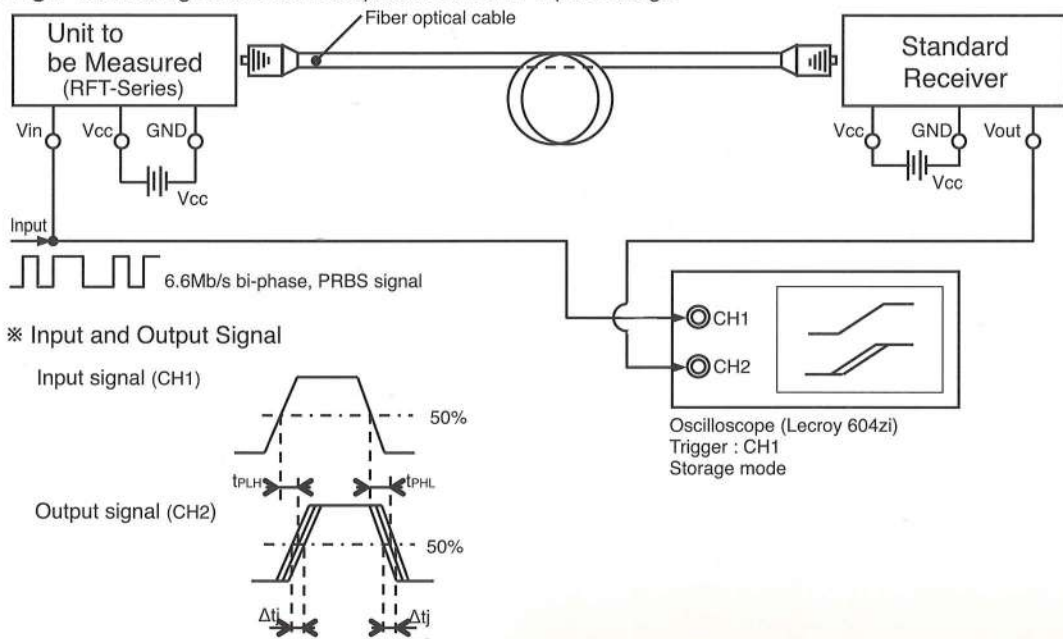
Parameter	Conditions	Judgement Method
$V_{IH}$	$V_{IN} = 2.0V$ or more	$-21 \leq P_C \leq -15dBm$ , $I_{CC} = 8mA$ or less
$V_{IL}$	$V_{IN} = 0.8V$ or less	$P_C \leq -36dBm$ , $I_{CC} = 8mA$ or less



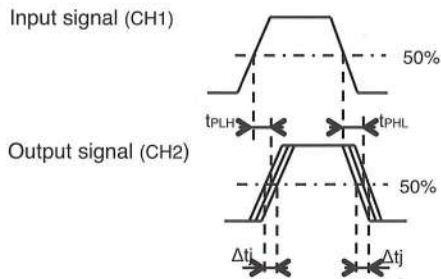
③ Fig.3 Measuring Method of Pulse Response



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



※ Input and Output Signal





Parameter	Symbol	Test Conditions
Low → High Pulse Delay Time	$T_{PLH}$	Refer to the above prescriptions
High → Low Pulse Delay Time	$T_{PLH}$	Refer to the above prescriptions
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

\* Note

1. Standard of operating :  $V_{CC}=5.0V \pm 0.05V$ .
2. Input signal : 6.6Mbps Bi-phase PRBS  $V_{IH} \geq 2.0V$ ,  $V_{IL} \leq 0.8V$ ,  $t_r$ ,  $t_f \leq 5ns$ .
3. Standard fiber optical cable (POF, 1m)
4. To bundle up the standard fiber cable, make it into a loop with the diameter of 10cm or more.
5. At measure jitter, set the oscilloscope to the storage mode and write time to 4 seconds.
6. The probe for the oscilloscope must be more than  $1M\Omega$  and less than 10pF.

## 5. Reliability Test Item and Standard.

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

① Confidence level : 90%

② LTPD : 10% / 20%

No.	Test Item	Test Conditions	Judgment Standard	Fail(c) / Samples(n)
1	High Temp. Storage (*2)	$T_a = +80^\circ C$ , $t = 500hr's$	Each characteristics given in 1 to 9 must be with the following range.  1. $P_c$ ( $V_{CC}=5.0V$ ) Brightness attenuate Difference : 20% less  2. $I_{CC}$ ( $V_{CC}=5.0V$ ) Consumption Current $I_{CC} < 8mA$  3. $t_r$ ( $V_{CC}=5.0V$ ) Rise time $t_r < 30ns$  4. $t_f$ ( $V_{CC}=5.0V$ ) Fall time $t_f < 30ns$	$C=0 / n=22$
2	Low Temp. Storage (*2)	$T_a = -30^\circ C$ , $t = 500hr's$		$C=0 / n=22$
3	High Temp. Operating (*1,*2)	$T_a = +70^\circ C$ , $V_{CC}=5.0V$ $t = 500hr's$		$C=0 / n=22$
4	Low Temp. Operating (*1,*2)	$T_a = -20^\circ C$ , $V_{CC}=5.0V$ $t = 500hr's$		$C=0 / n=22$
5	High Temp./ High Hum. Storage (*1,*2)	$T_a = +85^\circ C$ , 85%RH $V_{CC}=5.0V$ , $t = 500hr's$		$C=0 / n=22$
6	Temperature Cycle (*2,*3)	$T_a = -30^\circ C(0.5h)$ to $+85^\circ C(0.5h)$ 20cycle		$C=0 / n=22$
7	P.C.T (*2)	$T_a = +121^\circ C$ 100%RH, $P=1atm$ , $t=4hr's$		$C=0 / n=22$
8	Solder Heat (*2,*4)	$T_a = +350 \pm 5^\circ C$ , 3s		$C=0 / n=11$
9	Solderability (*2)	Soldering Temp.: $245 \pm 5^\circ C$ , 10s Pb free solder : Sn-3.0Ag/0.5Cu		$C=0 / n=11$

(\*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 10sec (after mounting on PCB with thickness of 1.2mm)

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



## 6. Package for Fiber Optic Modules.

