

# **InGaAs-APD/Preamplifier Receiver** *FRM5W231KT/LT*

## **FEATURES**

- Data rate up to 2.5Gb/s
- -32dBm typ. sensitivity
- 30μm active area APD chip with GaAs pre-amplifier
- Small co-axial package with single mode fiber

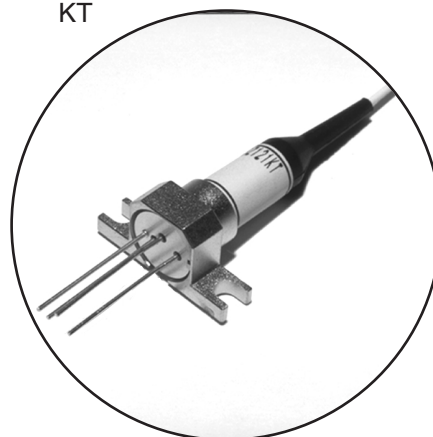
## **APPLICATIONS**

- High bit rate long haul optical transmission systems operating at 2.5Gb/s

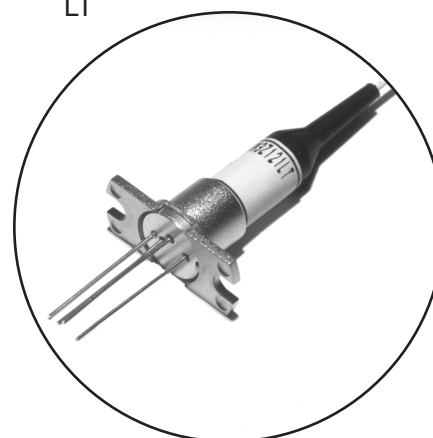
## **DESCRIPTION**

These APD preamplifiers use an InGaAs APD chip with GaAs IC preamplifier. The KT package is designed for a horizontal PC board mount. The LT package is secured by a vertical flange. Each package is connected with single mode fiber by Nd: YAG welding. The detector preamplifier is DC coupled and has a low electrical output when the APD is illuminated.

KT



LT



# FRM5W231KT/LT InGaAs-APD/Preamp Receiver

## ABSOLUTE MAXIMUM RATINGS (T<sub>C</sub>=25°C, unless otherwise specified)

Parameter	Symbol	Ratings	Unit
Storage Temperature	T <sub>stg</sub>	-40 to +85	°C
Operating Temperature	T <sub>op</sub>	-40 to +85	°C
Supply Voltage	V <sub>SS</sub>	-7 to 0	V
APD Reverse Voltage	V <sub>R</sub> (Note 1)	0 to V <sub>B</sub>	V
APD Reverse Current	I <sub>R</sub> (Note 2)	0.6	mA

## OPTICAL & ELECTRICAL CHARACTERISTICS (T<sub>C</sub>=25°C, λ=1,310/1,550nm, V<sub>SS</sub>=-5.2V, unless otherwise specified)

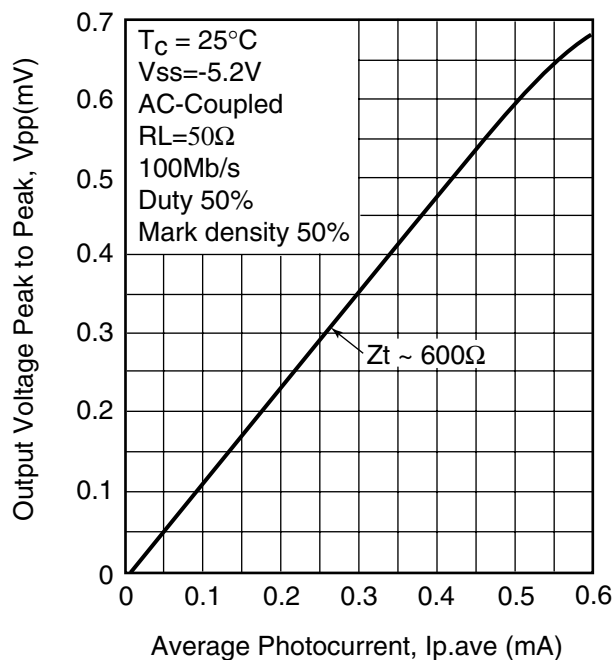
Parameter	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
APD Responsivity	R15	1,550nm, M=1	0.80	0.85	-	A/W
	R13	1,310nm, M=1	0.75	0.85	-	A/W
APD Breakdown Voltage	V <sub>B</sub>	I <sub>D</sub> =10μA	40	50	65	V
Temperature Coefficient of V <sub>B</sub>	γ	Note 3	0.08	0.12	0.15	V/°C
AC Transimpedance	Z <sub>t</sub>	AC-Coupled, f=100MHz, R <sub>L</sub> =50Ω, P <sub>in</sub> < -20dBm,	400	600	-	Ω
Bandwidth	BW	AC-Coupled, R <sub>L</sub> =50Ω, M=3 to 15, -3dBm from 1MHz	1.8	2.0	-	GHz
Equivalent Input Noise Current Density	i <sub>n</sub>	AC-Coupled, R <sub>L</sub> =50Ω, Average within BW	-	6.5	8	pA/√Hz
Sensitivity	P <sub>r</sub>	2.488Gb/s NRZ, PRBS=2 <sup>23</sup> -1, B.E.R.=10 <sup>-10</sup> , V <sub>R</sub> is set at optimum value	-	-32	-31	dBm
		T <sub>C</sub> =-40 to +85°C	-	-31	-30	dBm
Maximum Overload	P <sub>O</sub>	2.488Gb/s NRZ, M=3, PRBS=2 <sup>23</sup> -1, B.E.R.=10 <sup>-10</sup> , V <sub>R</sub> is set at optimum value	-5	-	-	dBm
		T <sub>C</sub> =-40 to +85°C, M=3	-7	-	-	dBm
Power Supply Current	I <sub>SS</sub>	-	-	-	40	mA
Power Supply Voltage	V <sub>SS</sub>	-	-5.46	-5.2	-4.94	V

Note: (1) V<sub>B</sub> differs from device to device. V<sub>B</sub> data is attached to each devices.

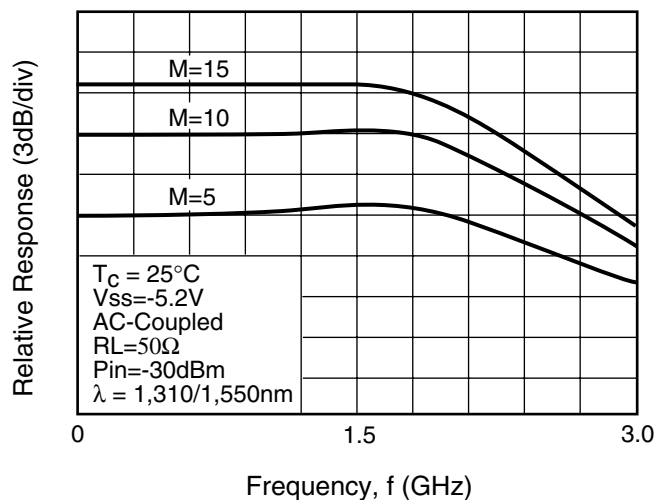
(2) CW condition

(3) γ=dV<sub>B</sub>/dT<sub>C</sub>

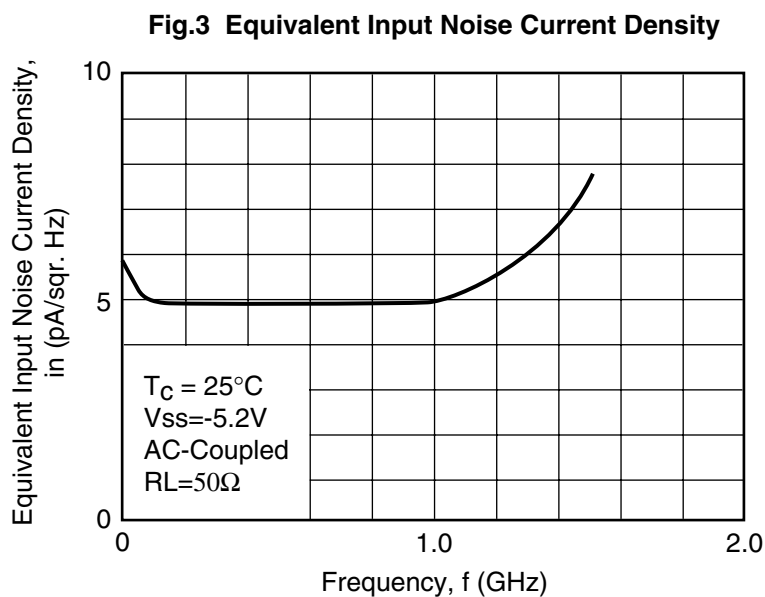
**Fig. 1 Output Characteristics**



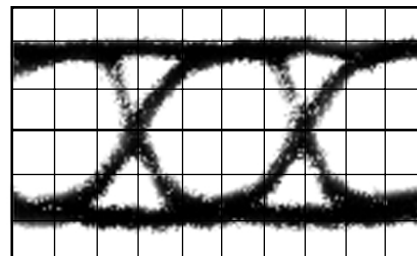
**Fig. 2 Relative Frequency Response**



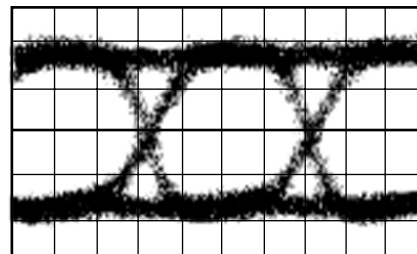
**Fig.4 Eye Diagram with a 1,550nm, 2.5Gb/s NRZ,  $2^{23}-1$  PRBS incident signal**



Input optical wave form with Bessel filter

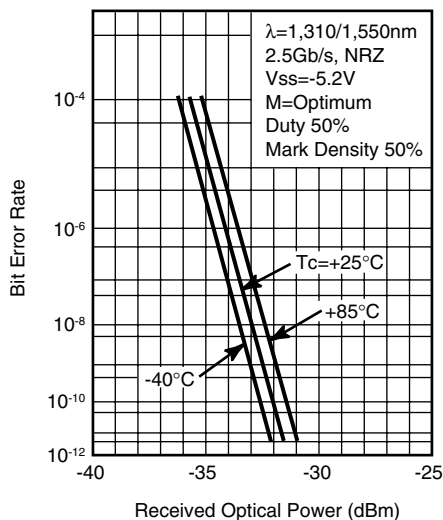


Equivalent output wave form at  $P_{in} = -32\text{dBm}$ ,  $T_c = 25^\circ\text{C}$ ,  $M = \text{optimum}$



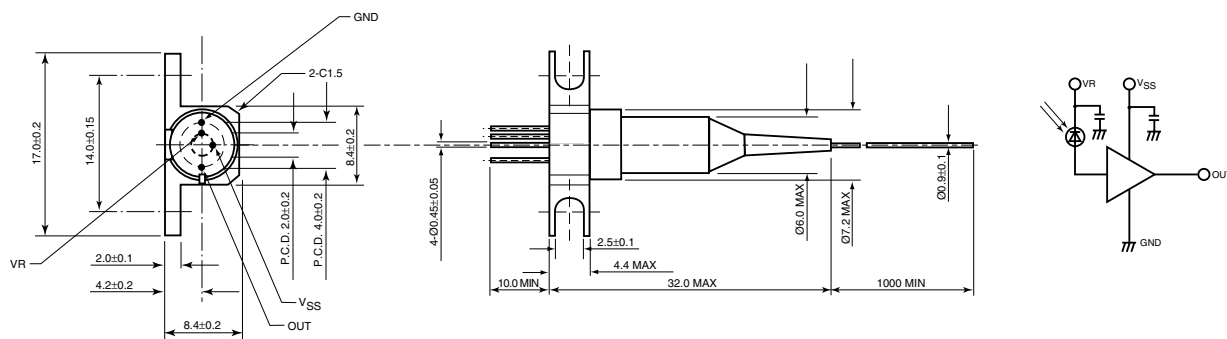
100ps/div

Fig.5 Bit Error Rate



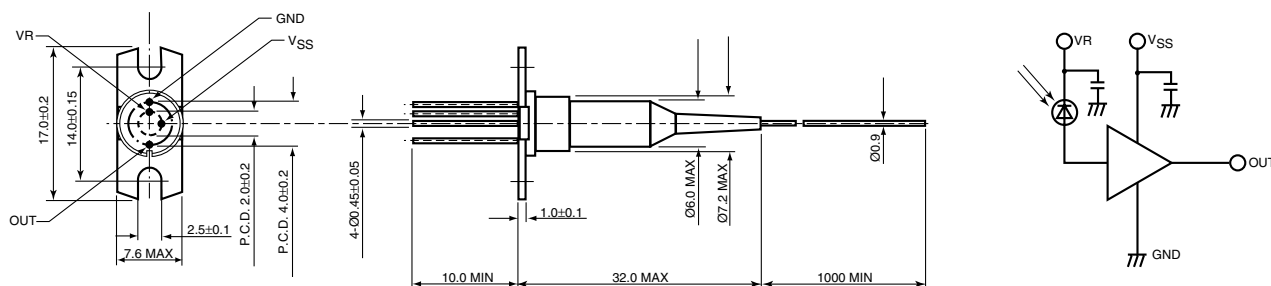
## "KT" PACKAGE

UNIT: mm



## "LT" PACKAGE

UNIT: mm



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