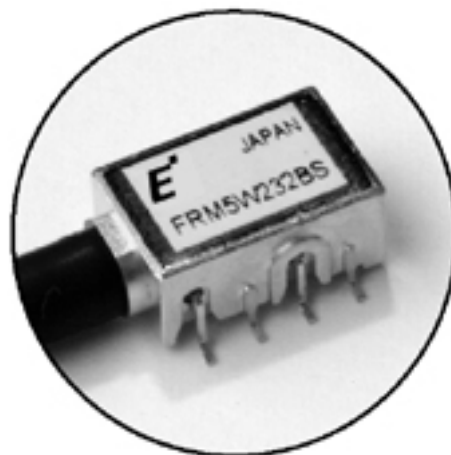


# InGaAs-APD/Preamp Receiver *FRM5W232BS/BS-A*

## FEATURES

- 2.7Gb/s APD Receiver module in an industry standard mini-DIL package is available in gull-wing or through-hole configuration
- High Sensitivity: -34 dBm (typ.)
- Differential Electrical Output
- Integral Thermistor and GaAs IC Preamp
- Wide operating temperature range: -40 to +85°C



## APPLICATIONS

This APD detector preamp is intended to function as an optical receiver in long haul SONET, SDH, and DWDM systems operating up to 2.7Gb/s. The device operates in both the 1,310 and 1,550nm wavelength windows. The nominal 10K $\Omega$  integral thermistor allows accurate monitoring of the APD temperature and facilitates the design of the APD bias control circuits. The detector preamplifier has a differential electrical output.

## DESCRIPTION

The FRM5W232BS incorporates a 30 micron InGaAs Avalanche Photodiode (APD) detector, a GaAs IC transimpedance preamplifier, and a thermistor in a mini-DIL type package. The APD is processed with modern MOVPE techniques resulting in reliable performance over a wide range of operating conditions. The lens coupling system and the single mode fiber are assembled using Nd: YAG welding techniques. The BS package is designed for a surface mount PC board assembly, and the BS-A is designed for through-hole mount assembly.

## 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 Case Temperature	T <sub>op</sub>	-40 to +85	°C
Supply Voltage	V <sub>DD</sub>	0 to +4.5	V
APD Reverse Voltage	V <sub>R</sub>	0 to V <sub>B</sub> (Note)	V
APD Reverse Current	I <sub>R</sub> (peak)	3.0	mA

Note: Since the V<sub>B</sub> may vary from device to device, V<sub>B</sub> data is attached to each device for reference.

**Eudyna**

# FRM5W232BS/BS-A InGaAs-APD/Preamplifier Receiver

## OPTICAL & ELECTRICAL CHARACTERISTICS

(T<sub>C</sub>=25°C, λ=1,550nm, V<sub>DD</sub>=+3.3V unless otherwise specified)

Parameter	Symbol	Test Conditions			Limits		Unit
				Min.	Typ.	Max.	
APD Responsivity	R13	$\lambda = 1,310\text{nm}$ , M=1		0.75	0.80	-	A/W
	R15	$\lambda = 1,550\text{nm}$ , M=1		0.80	0.85	-	
	R16	$\lambda = 1,610\text{nm}$ , M=1		-	0.70	-	
APD Breakdown Voltage	VB	ID=10 $\mu$ A		40	50	65	V
Temperature Coefficient of VB	$\gamma$	Note (1)		0.08	0.12	0.15	V/°C
AC Transimpedance	Z <sub>t</sub>	Pin=-30dBm, f=100MHz, Single-end		1800	2200	2600	$\Omega$
Bandwidth	BW	Pin=-30dBm, M=10, -3dB from 1MHz		2.2	2.4	-	GHz
Lower Cut-Off Frequency	f <sub>cl</sub>			-	50	75	kHz
Peaking	d <sub>pk</sub>	Pin=-30dBm, M=10, from 1MHz		-	-	+2	dB
Group Delay Deviation	GD	Pin=-30dBm, M=10, from 500MHz to 1.75GHz		-	100	-	psec
Output Return Loss	S22	up to 1.75GHz		10	-	-	dB
		up to 2.5GHz		5	-	-	
Equivalent Input Noise Current Density	i <sub>n</sub>	Average within 2.2GHz		-	9.5	11	pA $\sqrt{\text{Hz}}$
Minimum Sensitivity	P <sub>r</sub>	Note (4)	Ta=25°C, Rext=14dB	-	-34.0	-33.0	dBm
			Ta=-40°C ~ 85°C, Rext=14dB	-	-33.0	-31.0	
			Ta=25°C, Rext=10dB	-	-33.0	-	
Maximum Overload	P <sub>max</sub>	2.488Gb/s, NRZ, PRBS=2 <sup>23</sup> -1, BER=10 <sup>-10</sup> , M=3		-5	-	-	dBm
		M=3, Note (3)		-7	-	-	
Maximum Output Voltage Swing	V <sub>clip</sub>	Saturated Output Voltage		450	550	800	mV
Optical Return Loss	ORL	-		30	-	-	dB
Power Supply Current	I <sub>DD</sub>	-		-	45	70	mA
Power Supply Voltage	V <sub>DD</sub>	-		3.15	3.30	3.45	V
Thermistor Resistance	R <sub>th</sub>	T <sub>C</sub> =25°C		9.5	10.0	10.5	k $\Omega$
Thermistor B Constant	B	-		3800	3900	4000	K

Note: (1) γ=ΔVB/ΔT<sub>C</sub>

Note: (2) All the parameters are measured with 50Ω AC-coupled.

Note: (3) Defined by 10% distortion of wave form.

Note: (4) Test condition is 2.488Gb/s, NRZ, PRBS=2<sup>23</sup>-1, B.E.R.=10<sup>-10</sup>, VR=Optimum with fc=1866MHz Bessel.

Notes

# InGaAs-APD/Preamp Receiver FRM5W232BS/BS-A

