

# Ultrabroadband RF Amplifier 30kHz to 45GHz



7.5 Vp-p output, 30dB Gain

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This is a high-gain, low-noise 3-stage amplifier delivering 7 Vp-p output across a broad frequency range of 30 kHz to 45 GHz. It is a general-purpose broadband driver amplifier optimized for Mach-Zehnder optical modulator applications, offering low power dissipation, high drive capability, very low added jitter, and fast rise time. The amplifier requires a 12 V DC power supply at 300 mA and features a GPPO male connector and optional 2.92mm Female connector adaptor. A compatible power supply is included for user convenience.

### Features

- 7.5 Vp-p (23 dBm saturated output power)
- < 8 ps rise/fall time
- < 0.5 ps added rms jitter
- 27 dB gain (to 45 GHz)
- 3.4 W Power Dissipation
- Useful gain to 65 GHz
- Small Size Package

### Applications

- Mach-Zehnder optical modulator driver
- High frequency/optical communications test instrumentation
- General purpose gain block

### Specifications

Parameter	Min	Typical	Max	Unit	
Frequency Range	30kHz		45GHz	kHz-GHz	
Signal Gain (S21)	0.01 – 26 GHz	27	30	35	dB
	26 – 45 GHz	24	27	35	
Rise/Fall Time	5	8	10	ps	
Added Jitter (rms method) [1], [2]	0.2	< 0.5	< 1	ps	
Input Signal	300	450	600	mV	
Input Match (S11)	0.01 – 26 GHz	-12	-10	dB	
	26 – 45 GHz	-10	-8		
Output Match (S22)	0.01 – 26 GHz	-12	-10	dB	
	26 – 45 GHz	-10	-4		
Output Vpp		7	7.5	Vpp	
Current		50	80	mA	
Input Return Loss		-10		dB	
Output Return Loss		-10		dB	
Spec Temp		25		°C	
Weight (Without Heatsink)		69		g	
Power Supply		+12		V	
Operating Temperature		-40 to +75		°C	
Storage Temperature		-55 to +125		°C	
Input Port		GPPO Male	2.92mm Female		
Output Port		GPPO Male	2.92mm Female		

#### Notes:

- [1].  $(\text{Jitter}_{\text{added}})^2 = (\text{Jitter}_{\text{output}})^2 - (\text{Jitter}_{\text{input}})^2$
- [2]. Under typical 400mV Input Amplitude.



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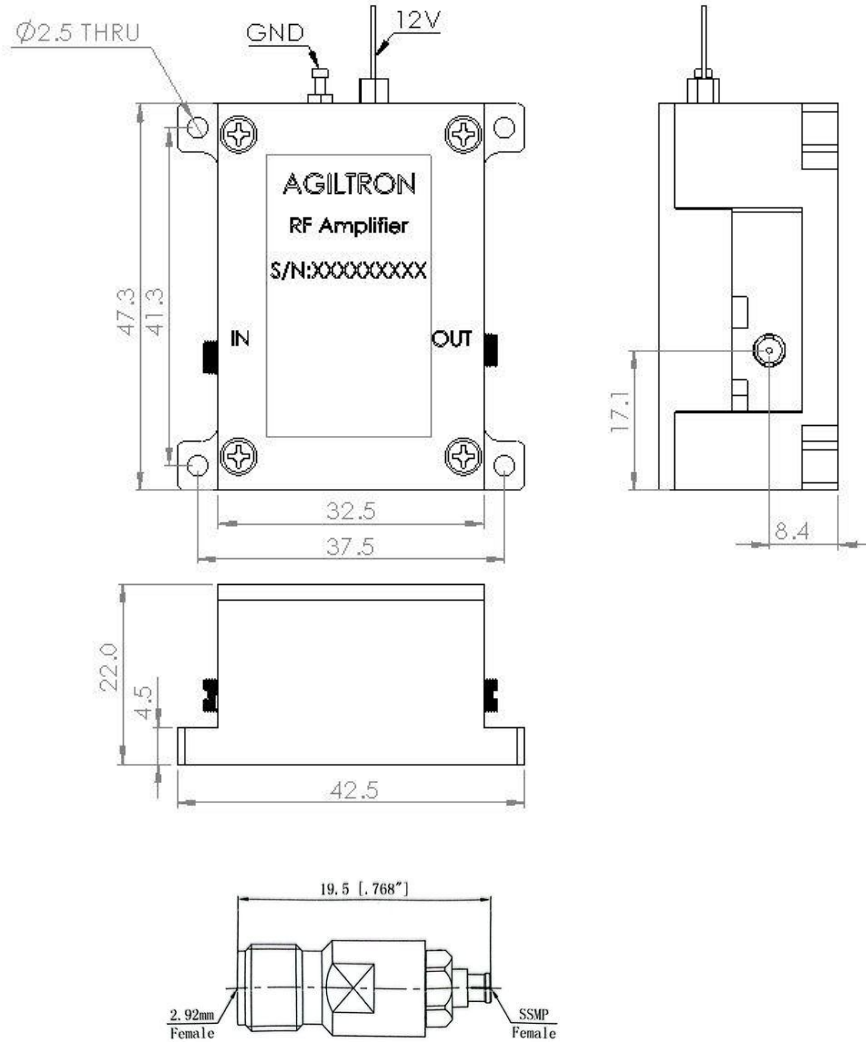
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### Dimensions (mm)



### Ordering Information (Part Number)

Prefix	3K	45	3	7	□□	1
Prefix	Low Frequency	High Frequency	Amplifier Stage	Output	Connector	Module <sup>[1]</sup>
<b>BRFA-</b>	30kHz = 3K	45GHz = 45 55GHz = 55	3 = 3	7V = 7	GPPO = 11 2.92mm = 29	No = 1 Yes = 2

[1]. The module is a small metal box integrated with a power supply.

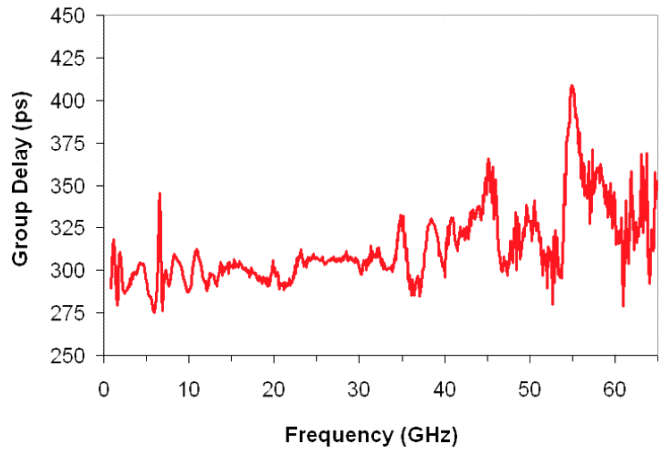
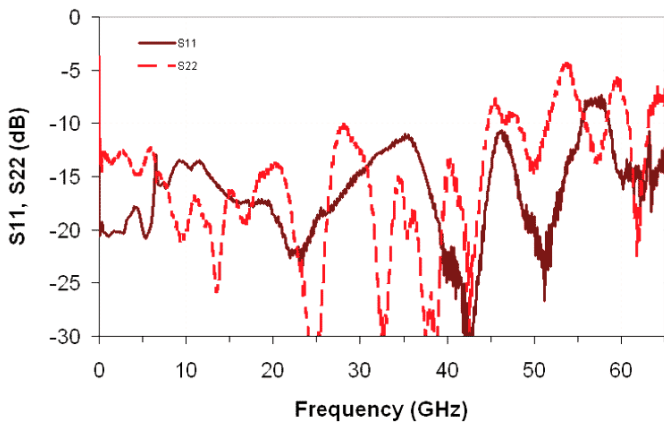
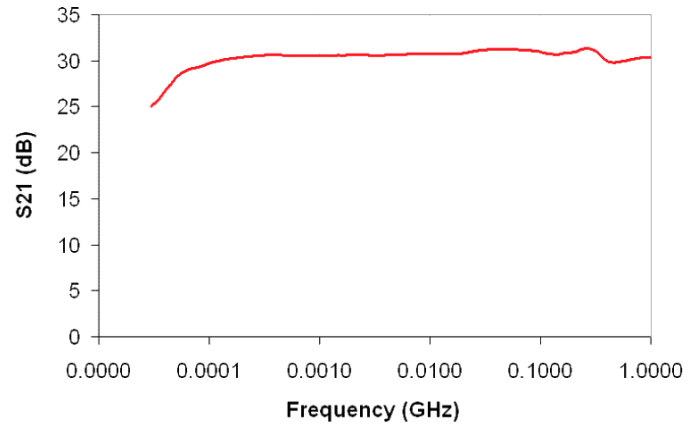
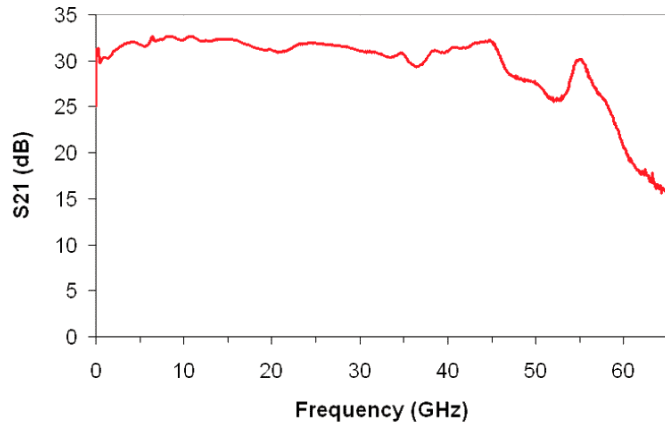
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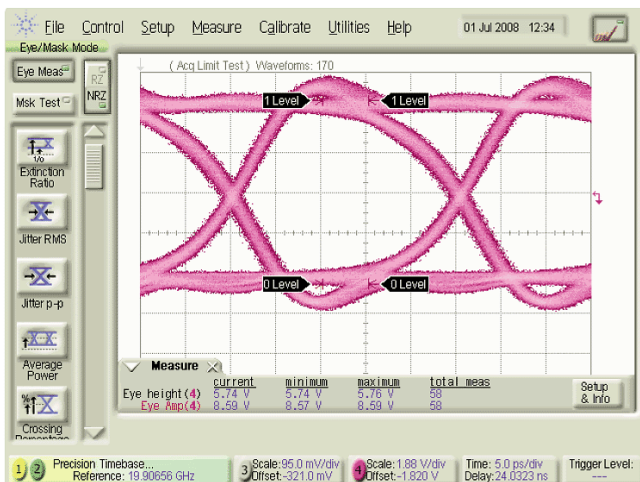
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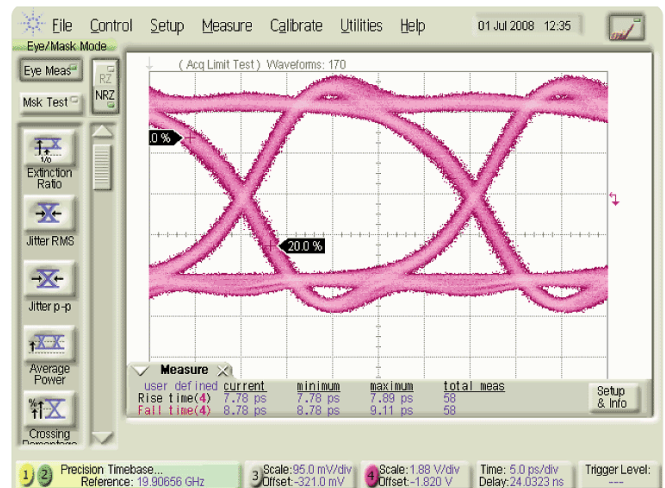
### Typical Response



The following data has been gathered from the typical measured performance. Bias: Vd1, Vd2, Vd3 = 7V, Id1 = 85mA, Id2 = 150mA, Id3 = 240mA.



(2<sup>31</sup> - 1) EYE: > 7V output (1.5V/div)



(2<sup>31</sup> - 1) EYE: < 10 ps Tr/Tf (5 ps/div)

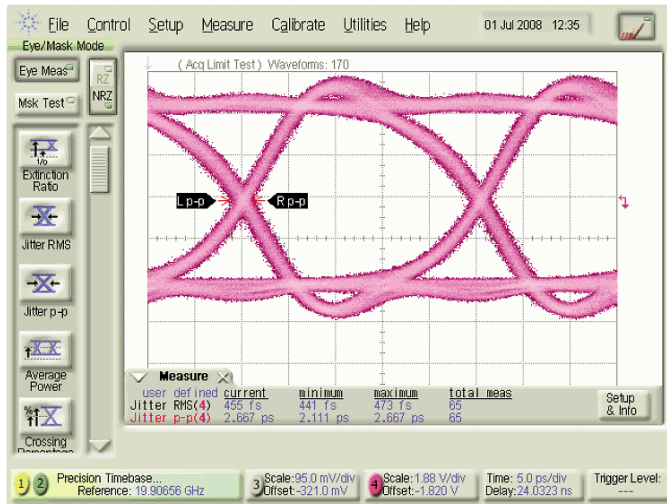
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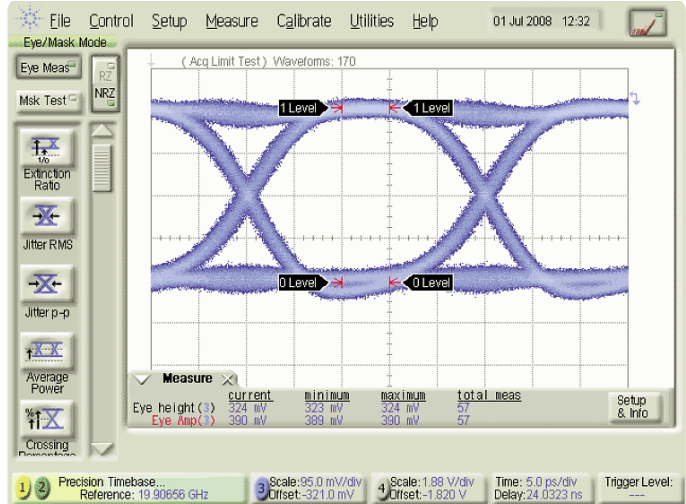
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### Typical Response



(2<sup>31</sup> - 1) EYE: <500 fs added rms jitter (5 ps/div)



Input from \_\_\_\_\_ and 3dB attenuator

## Application Notes

### Fiber Core Alignment

Note that the minimum attenuation for these devices depends on excellent core-to-core alignment when the connectors are mated. This is crucial for shorter wavelengths with smaller fiber core diameters that can increase the loss of many decibels above the specification if they are not perfectly aligned. Different vendors' connectors may not mate well with each other, especially for angled APC.

### Fiber Cleanliness

Fibers with smaller core diameters (<5 μm) must be kept extremely clean, contamination at fiber-fiber interfaces, combined with the high optical power density, can lead to significant optical damage. This type of damage usually requires re-polishing or replacement of the connector.

### Maximum Optical Input Power

Due to their small fiber core diameters for short wavelength and high photon energies, the damage thresholds for device is substantially reduced than the common 1550nm fiber. To avoid damage to the exposed fiber end faces and internal components, the optical input power should never exceed 20 mW for wavelengths shorter 650nm. We produce a special version to increase the handling by expanding the core side at the fiber ends.

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### Caution Electrostatic Sensitivity



- Never touch laser diode and the module using hands
- Always use protections when handle a laser diode
- Recommend mounting the laser diode using an ionic gun and ESD finger cots



### Laser Safety

This product meets the appropriate standard in Title 21 of the Code of Federal Regulations (CFR). FDA/CDRH Class 1M laser product. This device has been classified with the FDA/CDRH under accession number 0220191. All versions of this laser are Class 1M laser products, tested according to IEC 60825-1:2007 / EN 60825-1:2007. An additional warning for Class 1M laser products. For diverging beams, this warning shall state that viewing the laser output with certain optical instruments (for example eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard. For collimated beams, this warning shall state that viewing the laser output with certain instruments designed for use at a distance (for example telescopes and binoculars) may pose an eye hazard.

Wavelength = 1.3/1.5  $\mu\text{m}$ .

Maximum power = 30 mW.



\*Caution - Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

\*IEC is a registered trademark of the International Electrotechnical Commission.