


# 10Gb/s surface mount coplanar APD preamp receiver with integrated MEMS VOA

## ATV10GC

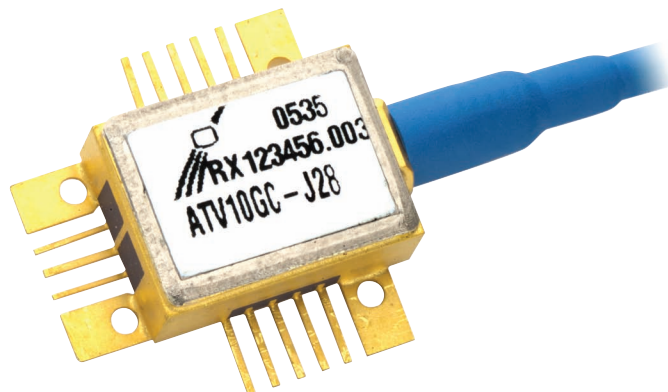
The ATV10GC receiver consists of an avalanche photodiode, a low-noise preamplifier, a MEMS variable optical attenuator (VOA), and a precision NTC thermistor in a hermetic coplanar package with a connectorized single-mode fiber pigtail. Differential outputs are provided to improve noise rejection for enhanced sensitivity. It has been optimised for use in 10Gb/s metro or long-haul applications, either as a discrete device or within a transponder, using NRZ modulation, with or without FEC, at data rates up to 10.709Gb/s.

### Features:

- High sensitivity, -26.5dBm typical
- Integrated MEMS VOA extends overload beyond +10dBm
- Low capacitance high speed InGaAs APD photodetector
- Supports FEC rates up to 10.709Gb/s
- Best in class power consumption, only 350mW
- Designed to exceed the environmental requirements of Telcordia GR-468-CORE
- RoHS 5/6 compliant 

### Applications:

- Client or line side links
- DWDM TDM transponder applications



## Operating Characteristics

Case Temperature = 25°C unless otherwise specified

Parameter	Symbol	Measurement Conditions	Min	Typ	Max	Unit
Optical sensitivity BOL [1] [2]	Sens	2 <sup>31</sup> -1 PRBS BER<10 <sup>-12</sup> V <sub>APD</sub> =V <sub>M10</sub>		-26.5	-25.0	dBm
Sensitivity penalty EOL over temperature [1] [2]		2 <sup>31</sup> -1 PRBS BER<10 <sup>-12</sup> V <sub>APD</sub> =V <sub>M10</sub> T=-5 to +75°C		0.75	1.0	dB
Deviation from linear phase		DC - 6GHz	-10		+10	°
High frequency -3dB corner	f <sub>H</sub>	V <sub>APD</sub> =V <sub>M10</sub> Small signal	7	7.5		GHz
Low frequency -3dB corner	f <sub>L</sub>				40	kHz
Transimpedance gain [3] [4] [5]	T <sub>Z</sub>	Small signal	1.1	1.6	2.3	kΩ
Maximum output voltage <sub>6</sub>	V <sub>OUT</sub>	Peak-to-peak		600	700	mV
Return loss	S <sub>22</sub>	DC to 7.0GHz			-8	dB
Optical overload [2]	P <sub>SAT</sub>	0dB Attenuation V <sub>APD</sub> =V <sub>M3</sub> BER<10 <sup>-12</sup>	-3	-1		dBm
Optical overload extension		With VOA actuated	+13			dBm
APD breakdown voltage	V <sub>br</sub>	T=25°C I <sub>APD</sub> =10mA	25		40	V
APD breakdown voltage temperature coefficient	T <sub>Vbr</sub>		0.030	0.045	0.061	V/°C
Dark current	I <sub>d</sub>	At 90% of V <sub>br</sub>			100	nA
Amplifier bias current	I <sub>cc</sub>			75	95	mA
Input current for output limiting	I <sub>in lim</sub>	Peak-to-peak		0.5		mA
VOA maximum attenuation	Att		20	30		dB
VOA control voltage [7]	V <sub>Att</sub>	Attenuation = 20dB		5.5	9	V
VOA current	I <sub>Att</sub>	Attenuation = 20dB		6	7.2	mA
VOA power dissipation (continuous)	P <sub>Att</sub>	Attenuation = 20dB		33	65	mW
VOA response time [8]		From attenuation = 1dB to 20dB		5	10	ms
Polarisation dependent loss	PDL	VOA unbiased			0.15	dB
Polarisation dependent loss	PDL	VOA biased			0.4	dB
Thermistor resistance	R <sub>TH</sub>	T=25°C		10		kΩ

### Notes:

[1] Optical Wavelength between 1525-1575nm. Data to 1610nm available on request.

[2] Measured with 9.95328Gb/s NRZ 1031-1 PRBS data and no FEC.

[3] Load impedance is 50Ω AC-coupled.

[4] Excludes APD responsivity.

[5] Differential.

[6] Single ended.

[7] Not polarity sensitive.

[8] Response time quoted is to achieve 99% of the desired attenuation value.

## Absolute Maximum Ratings

The table below provides maximum and/or minimum values of critical parameters which will not permanently damage the device, but for which the operating specification may not hold

Parameter	Symbol	Min	Typ	Max
Amplifier bias voltage	VCC	-6	0.5	V
Operating temperature [1]	Top	-40	+85	°C
Storage temperature [2]	Tstg	-40	+85	°C
Input photocurrent [3]	IPD		3	mA
APD bias voltage	VAPD	0	$V_{br}$	V
VOA control voltage [4]	VATT	0	9	V
Fiber bend radius		20		mm

### Notes:

[1] The operating temperature is defined as the temperature of the module case.

[2] The rating is referred to the ambient temperature.

[3]  $V_{APD} \cdot V_{M3}$ . Although implementation of a current limit is intuitive, it is not recommended as biasing below the specified  $M = 3$  voltage in the presence of a high optical power has been shown to cause device damage.

[4] Polarity Independent.

**Class 2 ESD precautions must be observed when handling these devices.**

## Pin Out

Pin #	Symbol	Parameter	Pin #	Function	Parameter
1	$V_{ATT}$	VOA control	10	Out_P	Positive RF data output
2	$V_{APD}$	APB bias voltage	11	GND	Case RF ground
3	NC	No connection	12	GND	Case ground
4	$V_{ee}$	Amplifier supply (-5.2V)	13	FB_in	Output offset control
5	NC	No connection	14	NC	No connection
6	GND	Case ground	15	NC	No connection
7	GND	Case RF ground	16	RTH	Thermistor
8	Out_N	Negative RF data output	17	GND	Case ground
9	GND	Case ground			

### Circuit Schematic

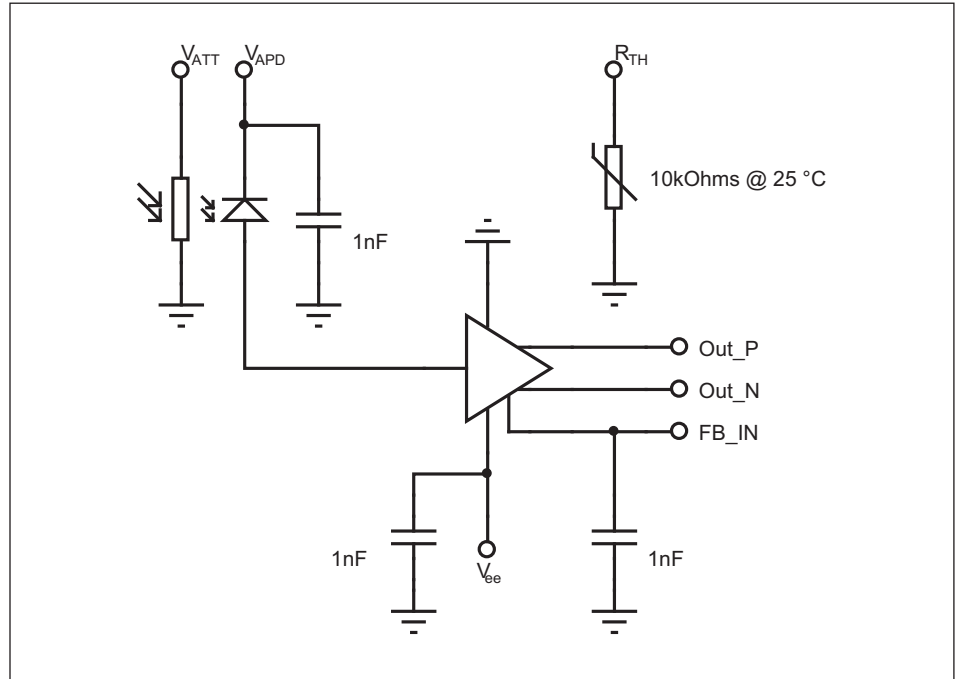


Figure [1] ATV10GC Circuit schematic.

### Outline Drawing

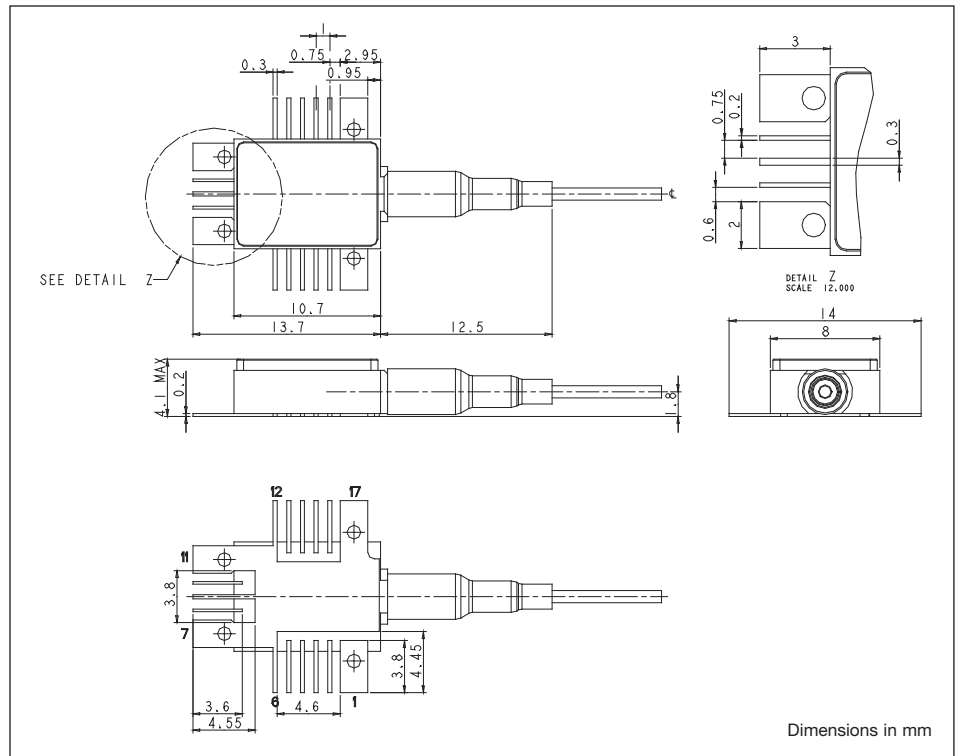


Figure [2] Outline diagram (Illustration only. For full details, refer to appropriate assembly drawing).  
**Note:** Fiber is 900mm secondary coated single-mode fiber, length = 1200 +0/-200mm.

**Typical Performance Characteristics**

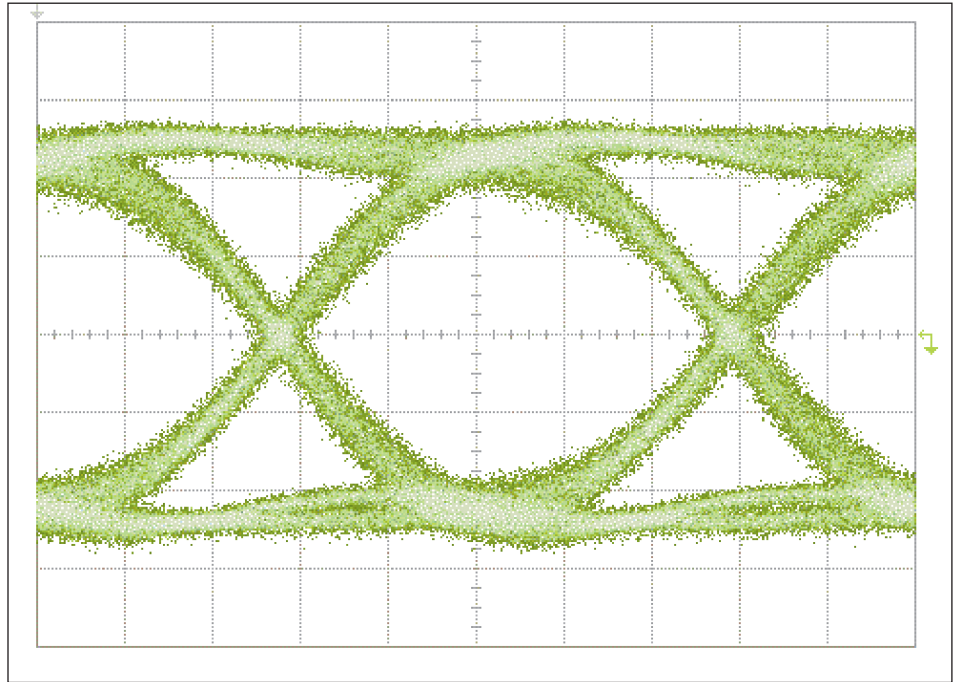


Figure [3] Electrical output data eye, M = 10, 10Gb/s  $2^{31}-1$  PRBS, -20dBm optical input.

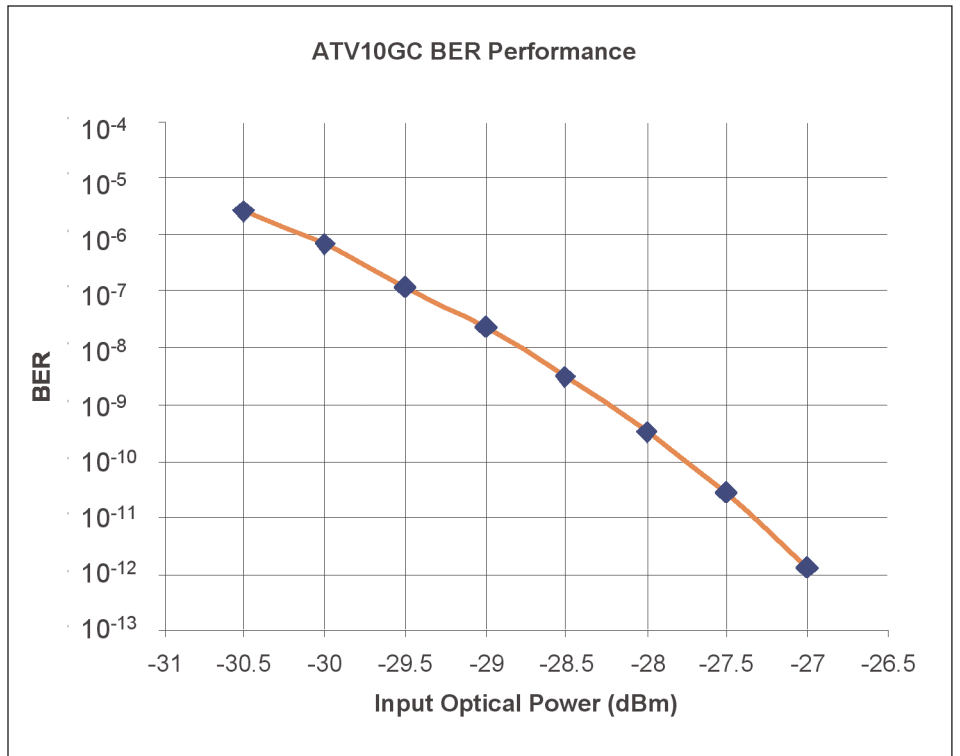


Figure [4] Typical BER performance, M = 10, 10Gb/s  $2^{31}-1$  PRBS, optical extinction ratio = 12dB.

Typical Performance Characteristics (continued)

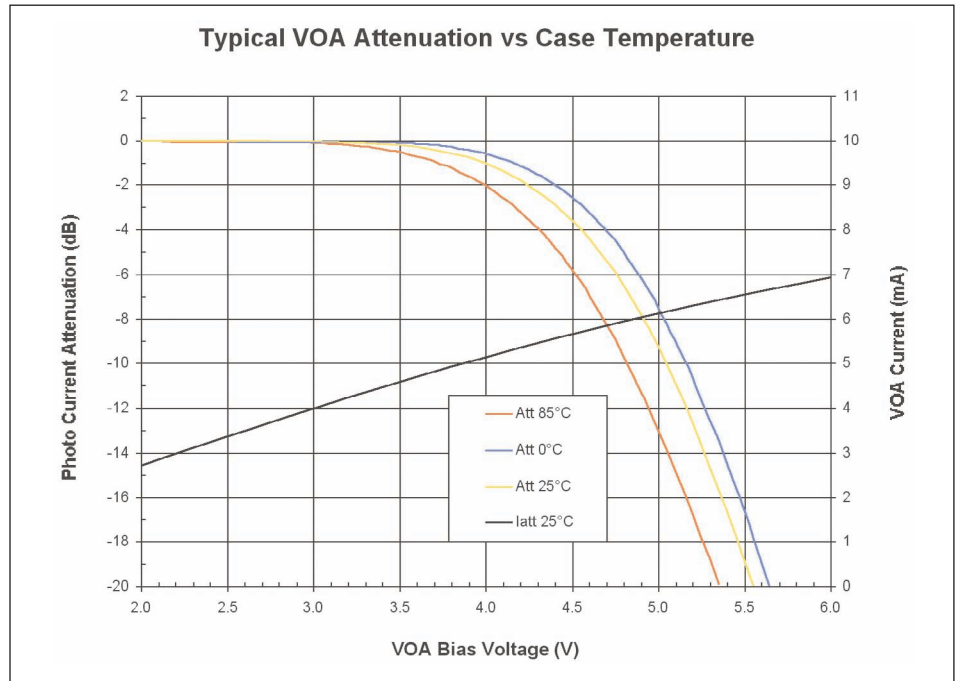


Figure [5] Typical VOA attenuation.

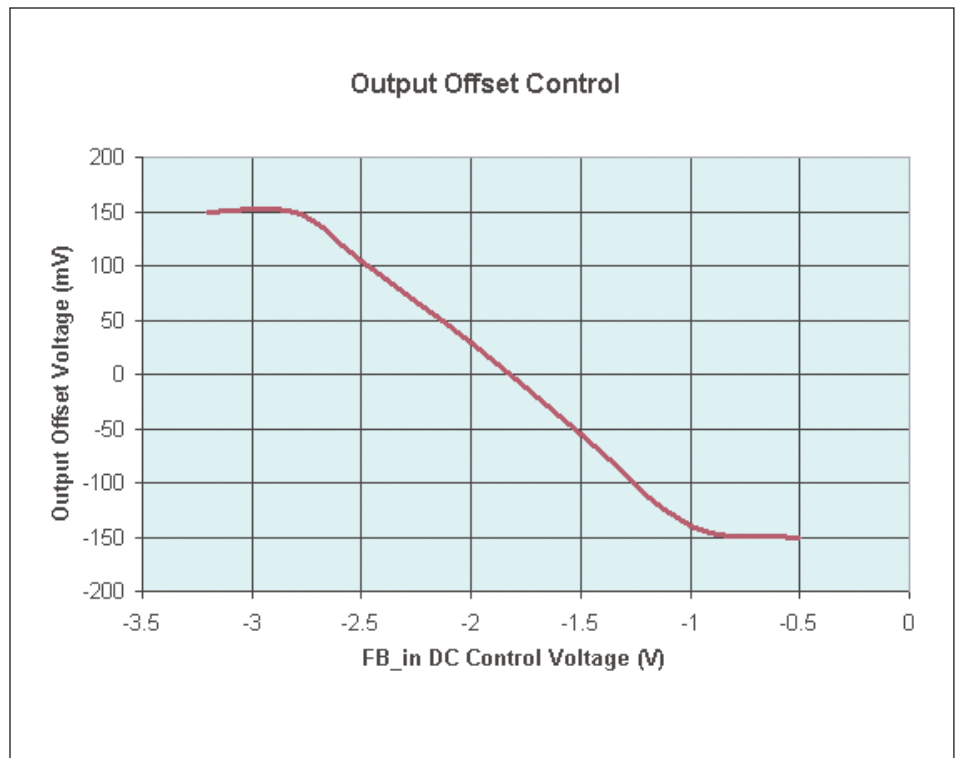


Figure [6] FB\_in transfer function.

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### Ordering Information:

ATV10GC - (Connector)  
 J28 = SC/PC  
 J57 = LC

e.g. ATV10GC-J28 is an ATV10GC with an SC/PC connector.

Other options available on request.

## Contact Information

### North America Bookham Worldwide Headquarters

2584 Junction Ave.  
 San Jose  
 CA 95134  
 USA

- Tel: +1 408 919 1500
- Fax: +1 408 919 6083

[www.bookham.com](http://www.bookham.com)  
[sales@bookham.com](mailto:sales@bookham.com)

### Europe Paignton Office

Brixham Road  
 Paignton  
 Devon  
 TQ4 7BE  
 United Kingdom

- Tel: +44 (0) 1803 66 2000
- Fax: +44 (0) 1803 66 2801

### Asia Shenzhen Office

2 Phoenix Road  
 Futian Free Trade Zone  
 Shenzhen 518038  
 China

- Tel: +86 755 33305888
- Fax: +86 755 33305805  
 +86 755 33305807

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