

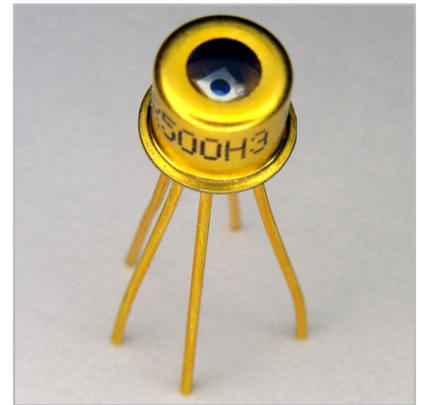
H2 / H3 / H4 / H5 Series Silicon and InGaAs-APD Receiver

Description

The H2/H3/H4/H5-Series includes a Silicon or InGaAs Avalanche Photodiode with an optimized low noise hybrid preamplifier for the use in high speed, low light detection, in laser range finding, LIDAR, medical and analytical applications. Housed in a 5 pin TO-46 or 6 pin TO-5 package they offer bandwidths up to 700 MHz and a differential ended output.

The Si-APDs used in these devices are SAR500, SAR1500 and for YAG enhanced application SAT800, providing very good response between 400 nm and 1100 nm and very fast rise and fall times at all wavelengths. For the wavelength range between 900 nm and 1700 nm our InGaAs-APD IAG-series is used. All APD Receivers are available with various gain/bandwidth configurations.

Custom versions with all other APD chips from our product range are available on request.



For field use we recommend to use our ABC550-04. This temperature-compensated HV supply allows constant responsivity to be maintained despite changes in temperature.

Features

- System Bandwidth 10 kHz – 700 MHz
- High Sensitivity
- High Speed
- Low noise
- Spectral response range
 - Si-APD: 400 nm to 1100 nm
 - InGaAs-APD: 900 nm to 1700 nm
- Hermetically sealed TO-46 or TO-5 package

Applications

- Range Finding / LIDAR
- Optical Communication Systems
- Laser Scanners
- Spectroscopy
- Fluorescence
- Medical

Generic Characteristics

	Min	Typ	Max	Units
Storage Temperature	-55		+100	°C
Operating Temperature	-40		+85	°C
Power Consumption				
H2-Series:		80		mW
H3-Series:		150		mW
H4-Series:		150		mW
H5-Series:		82		mW
Soldering (5 sec.)			200	°C

Si-APD-Receiver

SARXXXH2/H3/H4/H5-Series

Fig. 1: Spectral Response (@ M = 100, H2-Receiver)

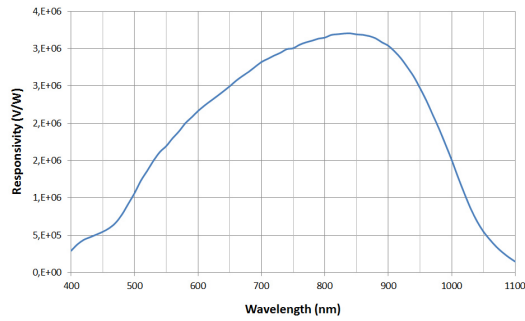
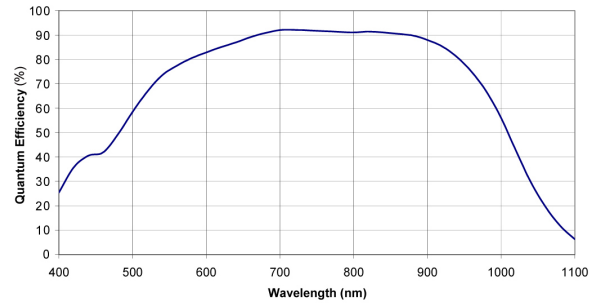


Fig. 2: Quantum Efficiency vs. Wavelength



Electrical Characteristics @ M = 100, Ta = 25°C (typical values)

Part Number	SAR500H2	SAR500H3	SAR500H4	SAR500H5	Units
Si-APD	SAR500	SAR500	SAR500	SAR500	
Diameter	0.5	0.5	0.5	0.5	mm
Wavelength Range	400 - 1000	400 - 1000	400 - 1000	400 - 1000	nm
Peak Sensitivity	905	905	905	905	nm
Bandwidth	10 k-100 M	10 k - 240 M	20 k - 470 M	20 k - 700 M	Hz
Supply Voltage-Vcc	3.3	5.0	3.3 or 5.0	3.3	Volt
Supply Current	25	30	30	25	mA
Responsivity					
540 nm	1.50	0.54	0.22	0.12	MV/W
650 nm	2.20	0.80	0.32	0.18	MV/W
905 nm	2.70	1.00	0.40	0.22	MV/W
NEP					
540 nm	70	75	230	420	fW/rtHz
650 nm	45	50	160	290	fW/rtHz
905 nm	40	40	125	230	fW/rtHz
Output Noise Density	100	40	50	50	nV/rtHz
Input Referred Noise Density (Max.)	2	2	7	11	pA/rtHz

Notes:

1. Noise measured at 100 kHz
2. All detailed specifications about the integrated APD is given in the data sheet of the SAR500-series

Electrical Characteristics @ $M = 100$, $T_a = 25^\circ\text{C}$ (typical values)

Part Number	SAR1500H2	SAR1500H3	SAR1500H4	SAR1500H5	Units
Si-APD	SAR1500	SAR1500	SAR1500	SAR1500	
Diameter	1.5	1.5	1.5	1.5	mm
Wavelength Range	400 - 1000	400 - 1000	400 - 1000	400 - 1000	nm
Peak Sensitivity	905	905	905	905	nm
Bandwidth	10 k-100 M	10 k - 240 M	20 k - 470 M	20 k - 700 M	Hz
Supply Voltage-Vcc	3.3	5.0	3.3 or 5.0	3.3	Volt
Supply Current	25	30	30	25	mA
Responsivity					
540 nm	1.50	0.54	0.22	0.12	MV/W
650 nm	2.20	0.80	0.32	0.18	MV/W
905 nm	2.70	1.00	0.40	0.22	MV/W
NEP					
540 nm	140	150	230	840	fW/rtHz
650 nm	90	100	160	580	fW/rtHz
905 nm	80	80	125	460	fW/rtHz
Output Noise Density	200	80	50	100	nV/rtHz
Input Referred Noise Density	4	4	7	22	pA/rtHz

Notes:

1. Noise measured at 100 kHz
2. All detailed specifications about the integrated APD is given in the data sheet of the SAR1500-series

Si-APD-Receiver

SAT800H2/H3/H4/H5-Series

Fig. 3: Spectral Response (@ M = 100, H2-Receiver)

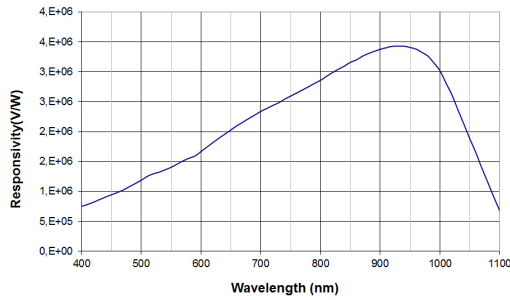
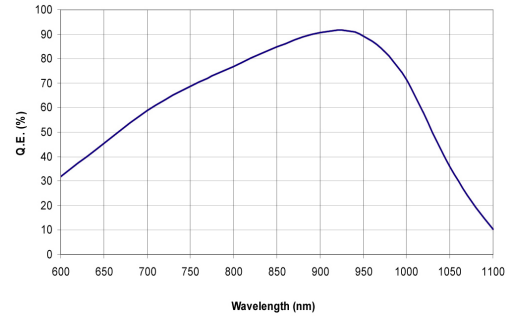


Fig. 4: Quantum Efficiency vs. Wavelength



Electrical Characteristics @ M = 100, Ta = 25°C (typical values)

Part Number	SAT800H2	SAT800H3	SAT800H4	SAT800H5	Units
Si-APD	SAT800	SAT800	SAT800	SAT800	
Diameter	0.8	0.8	0.8	0.8	mm
Wavelength Range	700 - 1000	700 - 1000	700 - 1000	700 - 1000	nm
Peak Sensitivity	940	940	940	940	nm
Bandwidth	10 k-100 M	10 k - 240 M	20 k - 470 M	20 k - 700 M	Hz
Supply Voltage-Vcc	3.3	5.0	3.3 or 5.0	3.3	Volt
Supply Current	25	30	30	25	mA
Responsivity					
540 nm	1.50	0.54	0.22	0.12	MV/W
650 nm	2.20	0.80	0.32	0.18	MV/W
905 nm	2.70	1.00	0.40	0.22	MV/W
NEP					
540 nm	70	75	230	420	fW/rtHz
650 nm	45	50	160	290	fW/rtHz
905 nm	40	40	125	230	fW/rtHz
Output Noise Density	100	40	50	50	nV/rtHz
Input Referred Noise Density	2	2	7	11	pA/rtHz

Notes:

- Noise measured at 100 kHz
- All detailed specifications about the integrated APD is given in the data sheet of the SAT800-series
- An export license is required for customers outside USA.

InGaAs-APD-Receiver

IAG080H2/H3/H4/H5-Series

Fig. 5: Spectral Response (@ M= 10, H2-Receiver)

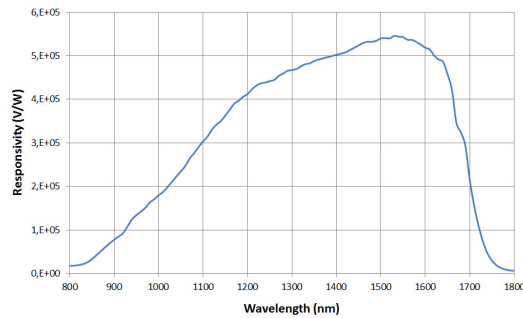
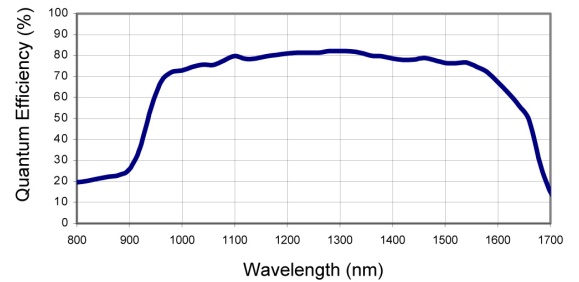


Fig. 6: Quantum Efficiency vs. Wavelength



Electrical Characteristics @ M = 10, Ta = 25°C (typical values)

Part Number	IAG080H2	IAG080H3	IAG080H4	IAG080H5	Units
InGaAs-APD	IAG080	IAG080	IAG080	IAG080	
Diameter	80	80	80	80	µm
Wavelength Range	900 - 1700	900 - 1700	900 - 1700	900 - 1700	nm
Peak Sensitivity	1550	1550	1550	1550	nm
Bandwidth	10 k-100 M	10 k - 240 M	20 k - 470 M	20 k - 700 M	Hz
Supply Voltage-Vcc	3.3	5.0	3.3 or 5.0	3.3	Volt
Supply Current	25	30	30	25	mA
Responsivity 1550 nm	0.50	0.19	0.075	0.042	MV/W
NEP 1550 nm	0.25	0.30	0.70	1.20	pW/rtHz
Output Noise Density	100	50	50	50	nV/rtHz
Input Referred Noise Density	2	3	7	12	pA/rtHz

Notes:

- Noise measured at 100 kHz
- All detailed specifications about the integrated APD is given in the data sheet of the IAG-series

InGaAs-APD-Receiver

IAG200H2/H3/H4/H5-Series

Fig. 5: Spectral Response (@ M= 10, H2-Receiver)

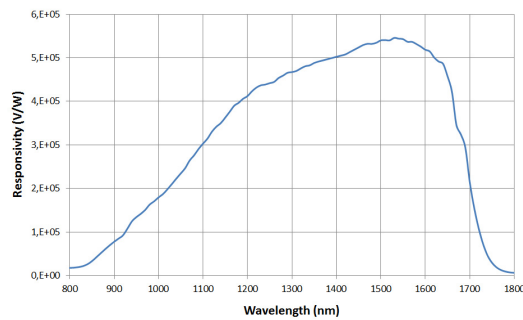
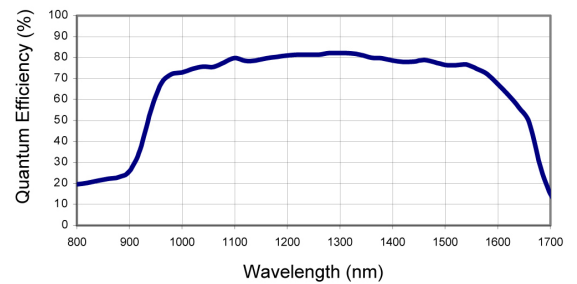


Fig. 6: Quantum Efficiency vs. Wavelength



Electrical Characteristics @ M = 10, Ta = 25°C (typical values)

Part Number	IAG200H2	IAG200H3	IAG200H4	IAG200H5	Units
InGaAs-APD	IAG200	IAG200	IAG200	IAG200	
Diameter	200	200	200	200	µm
Wavelength Range	900 - 1700	900 - 1700	900 - 1700	900 - 1700	nm
Peak Sensitivity	1550	1550	1550	1550	nm
Bandwidth	10 k-100 M	10 k - 240 M	20 k - 470 M	20 k - 700 M	Hz
Supply Voltage-Vcc	3.3	5.0	3.3 or 5.0	3.3	Volt
Supply Current	25	30	30	25	mA
Responsivity 1550 nm	0.50	0.19	0.075	0.042	MV/W
NEP 1550 nm	0.25	0.30	0.70	1.20	pW/rtHz
Output Noise Density	100	50	50	50	nV/rtHz
Input Referred Noise Density	2	3	7	1.2	pA/rtHz

Notes:

- Noise measured at 100 kHz
- All detailed specifications about the integrated APD is given in the data sheet of the IAG-series

InGaAs-APD-Receiver IAG350H2/H3/H4/H5-Series

Fig. 5: Spectral Response (@ M= 10, H2-Receiver)

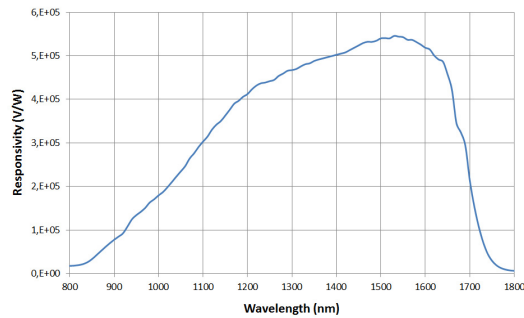
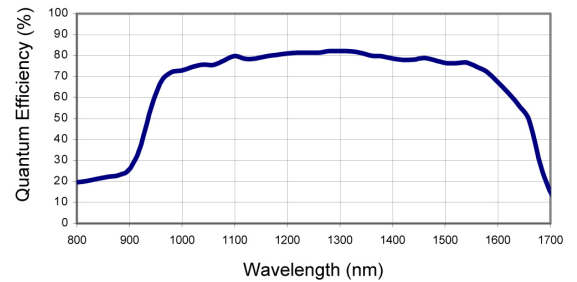


Fig. 6: Quantum Efficiency vs. Wavelength



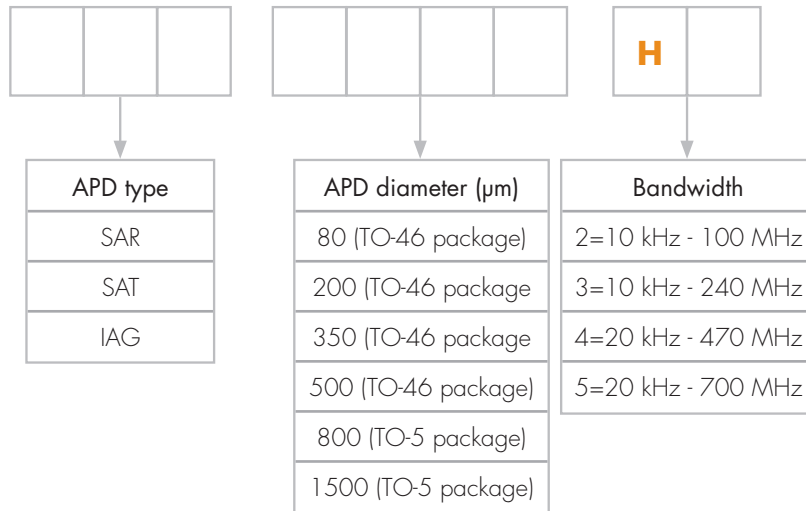
Electrical Characteristics @ M = 10, Ta = 25°C (typical values)

Part Number	IAG350H2	IAG350H3	IAG350H4	IAG350H5	Units
InGaAs-APD	IAG350	IAG350	IAG350	IAG350	
Diameter	350	350	350	350	µm
Wavelength Range	900 - 1700	900 - 1700	900 - 1700	900 - 1700	nm
Peak Sensitivity	1550	1550	1550	1550	nm
Bandwidth	10 k-100 M	10 k - 240 M	20 k - 470 M	20 k - 700 M	Hz
Supply Voltage-Vcc	3.3	5.0	3.3 or 5.0	3.3	Volt
Supply Current	25	30	30	25	mA
Responsivity 1550 nm	0.50	0.19	0.075	0.042	MV/W
NEP 1550 nm	0.40	0.70	1.00	1.80	pW/rtHz
Output Noise Density	200	120	75	75	nV/rtHz
Input Referred Noise Density	4	6	10	17	pA/rtHz

Notes:

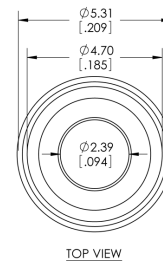
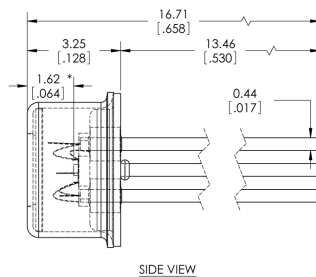
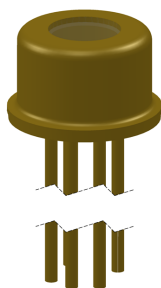
- Noise measured at 100 kHz
- All detailed specifications about the integrated APD is given in the data sheet of the IAG-series

Product Number Designation

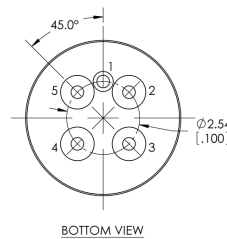
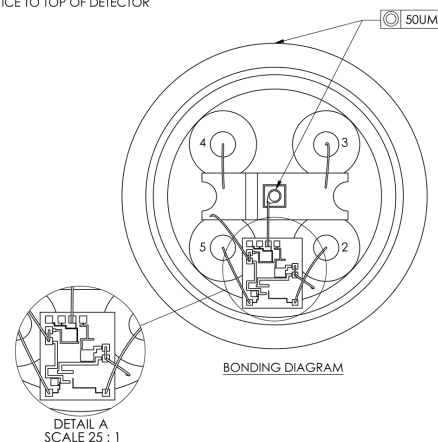


Package Drawings

Package TO-46 for APDs ≤ 500 µm, Dimensions in mm [inches]



* DISTANCE FROM TOP OF DEVICE TO TOP OF DETECTOR



PIN #1: Ground/Case
PIN #2: Out-
PIN #3: Vbias
PIN #4: Vcc
PIN #5: Out+

Package Drawings

Package TO-5 for APDs $\geq 800 \mu\text{m}$, Dimensions in mm [inches]

