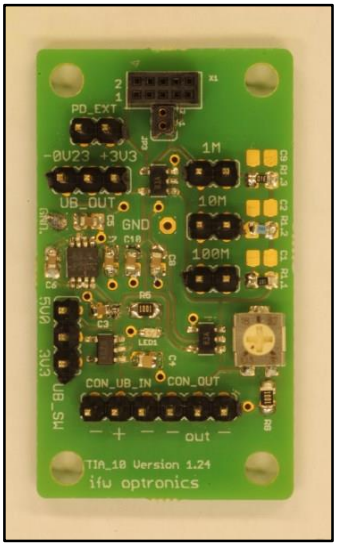
Evaluation Board for Photodiodes
JTIA1-1G

--- preliminary datasheet ---



Characteristics :

- custom switchable transimpedance 10 MΩ, 100 MΩ and 1 GΩ
- adjustable second stage amplification, range from 1x to 11x
- voltage output
- low dark offset
- single supply voltage
- pin headers for direct connection of all ifw-optronics SiC photodiodes
- RoHS und WEE conform

Applications :

- prototyping; evaluation of SiC photodiodes
- general purpose photocurrent I/V converter
- use for single parts and small series production

Absolute Maximum Ratings :

♦ supply voltage	+28 V
♦ working temperature	- 25 °C ... 70 °C
♦ storage temperature	- 25 °C ... 85 °C

General description :

The JTIA1 is a general purpose transimpedance amplifier board for photodiode measurements. The input side can either be directly equipped with TO5 or TO18 photdiodes via multi-header or via pin-header for external connections. A transimpedance amplifier provides photocurrent to voltage-output conversion (between 0 - 5 V) on the output side.

Gain Setting / Amplification:

The transimpedance gain can be set between three pre-configured values (10 / 100 / 1.000 MOhm) via jumpers. This corresponds to a photocurrent amplification between 0,1V/µA and 1V/nA. A second-stage amplifier allows for the additional, variable amplification in the range between 1x and 11x via trim-pot. Custom values for feedback resistor and feedback capacitor can be manufactured or hand-soldered (package size 0805) by the customer.

Power Supply:

The JTIA1 is internally regulated and supplied by a single-voltage supply between 6 V and 24 V and provides voltage output beween 0 V and 5 V. For operation with 5 V supplies, the internal voltage regulator can be set to 3,3 V. In this case, the input voltage can be as low as 4,5 V, with the drawback of a decreased output voltage between 0 V and 3,3 V. A negative supply-voltage is generated internally for minimum offset voltage.

ifw optronics GmbH
Otto-Schott-Str. 13
D-07745 Jena

www.ifw-optronics.com
info@ifw-optronics.com

Tel.: +49 3641 204-117
Fax: +49 3641 204-110

Overview Jumpers, Connectors:

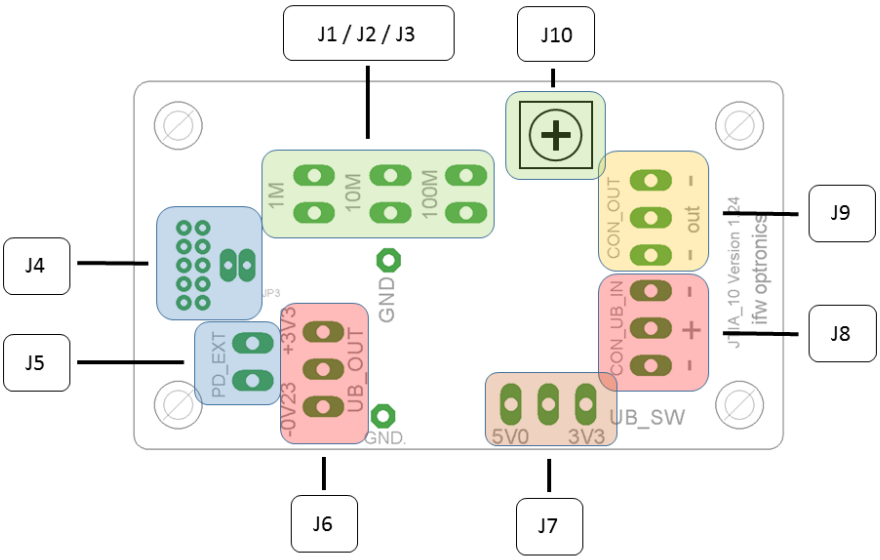


Figure 1: Schematic Overview of Jumpers, Connectors and Trimpots

Jumper J1 / J2 / J3:

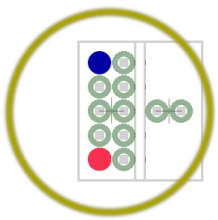
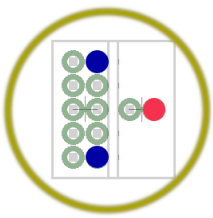
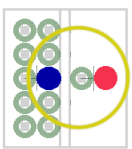
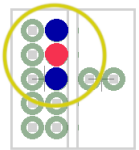
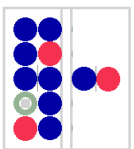
This set of jumpers sets the transimpedance gain of the first stage amplifier. Each jumper switches one feedback resistor and one feedback capacitor. The feedback capacitor is unpolulated by default, the parasitic capacitance is sufficient to damp the amplifier adequately. It is best practice to set only one jumper and leave the others unpopulated.

Name	Board description	Value
J1	1M	1 GOhm / 0 pF
J2	10M	10 MOhm / 0 pF
J3	100M	100 MOhm / 0 pF

Input J4:

Multipurpose Photdiodes input. Photodiode connector with 5,08 mm and 2,54 mm grid dimension.

Cathode to the input marked with red, Anode and case to ground marked with blue

TO39, 2-pin	TO39, 3-pin isolated	TO18, 2-pin	TO18, 3-pin, inline isolated	Overview
				
JEA1, JEAC1	JEA1I	JEA1S, JEA1SS	JEA1ISZ	

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Input J5:
Photdiode input for external connections.

Pin-Name	Function
PD	Anode + Ground
EXT	Cathode

Output J6:

Connector for internal regulated voltages:

Pin-Name	Function
-0V23	-0.232 V
Centerpin	GND
+3V3	Voltage set by J7 (+5V, +3,3V)

Jumper J7:

Jumper for internal voltage regulator. For external supply voltages larger than 6V, choose setting “5V0” for maximum output voltage swing.

Connection	internal Voltage	Minimal Input Voltage
5V0 - Centerpin	5,0 V	6,0 V
3V3 - Centerpin	3,3 V	4,5 V

Input J8:

Power supply connector.

Pin	Function
-	GND
+	Vs
-	GND

Output J9:

Voltage output.

Pin	Function
-	GND
out	Vout
-	GND

Trimpot J10:

Trimpot sets second-stage gain between 1x and 11x. For lowest offset choose amplification 1x (turn fully clockwise).

Function	Rotation
Increase gain	turn counter-clockwise
Decrease gain	turn clockwise

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Electrical Specifications :

Parameter / Option	Test conditions	value	Unit
Power Supply Voltage *Vs*	Setting J7: 5V0 Setting J7: 3V3	+6 … +24 +4,5 … +24	V
Slew rate (J10: 1x / 10x)	10%/90% Setting J1: 1M (1 Gohm)[1] Setting J2: 10M (10 Mohm) [1] Setting J3: 100M (100 Mohm) [1]	 6000 / 8000 30 / 50 500 / 600	µs
Offset voltage max. (J10: 1x / 10x)	Input J4, J5: open	±1 / ±1	mV
Dark offset voltage max. (J10: 1x / 10x)	E = 0 lx [1]	±1 / ±2	mV
Noise voltage (RMS) (J10: 1x / 10x)	Input J4, J5: open	0,7 / 6	mV
Saturation Output Voltage *Vout*	Setting J7: 5V0 Setting J7: 3V3	4,95 3,25	V
Short circuit current *Iout*	Setting J7: 5V0 Setting J7: 3V3	±90 ±50	mA
Current consumption *Is*	bright Setting J7: 5V0 (R_L=∞ / R_L=2kΩ)[1] Setting J7: 3V3 (R_L=∞ / R_L=2kΩ) [1]	 7,6 / 10,0 5,5 / 6,0	mA
Max output current via output J6	3,3 V / 5,0 V 0,23 V	+ 5,0 -1,5	mA

common test conditions, if not specified otherwise: T_A = 25 °C
[1]: with SiC photodiode JEA0,25 on input J4

Mechanical Specifications :

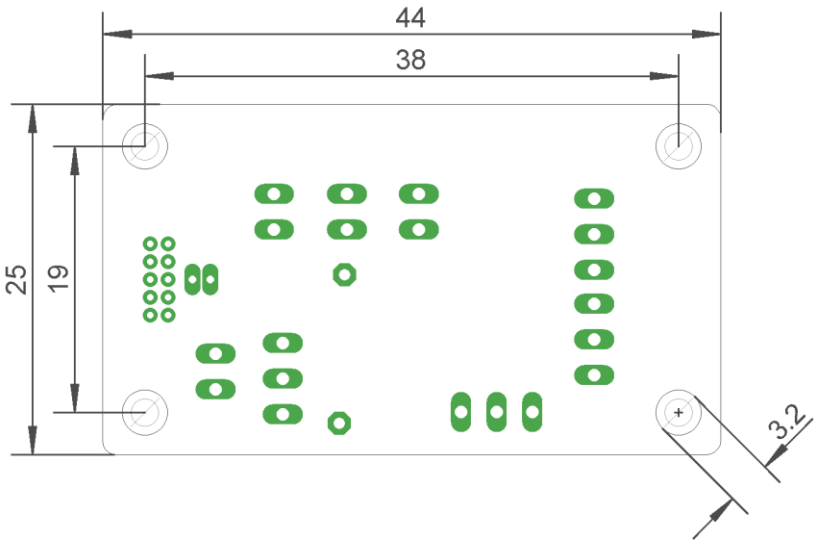

Figure 2: Mechanical Dimension

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Application notes:

- Use a regulated supply voltage and prevent overvoltage situations on J7. The internal powersupply is only protected by a linear LDO regulator.
- Electromagnetig shielding has to be provided for the evaluation board and the optional connection from photodiode to the board.
- Aviod contamination of the PCB. Since high-ohmic feedback networks are employed, parasitic resistance between parts has to be kept low. If custom values are soldered to J1, J2, J3, residual flux has to be removed.

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