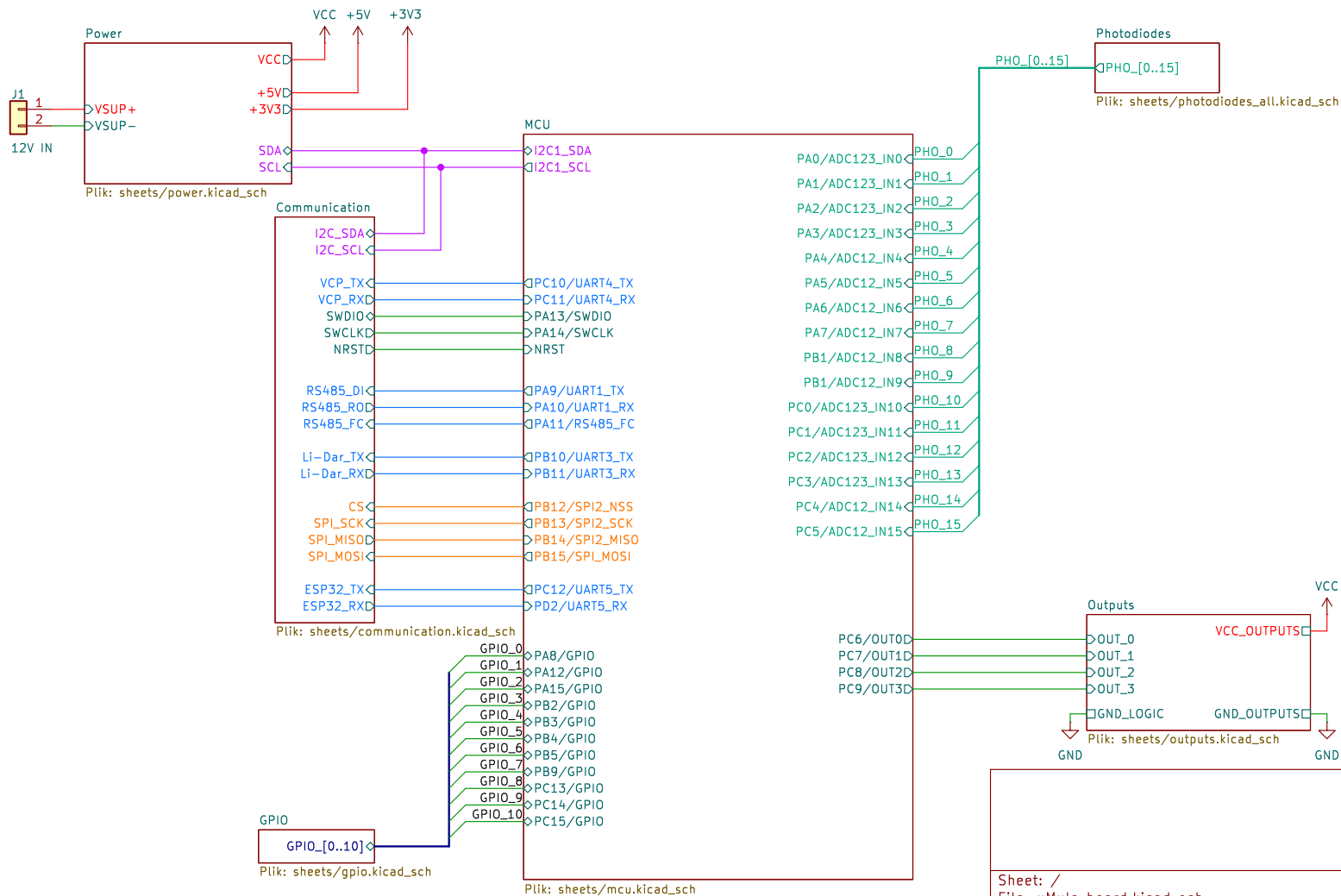


Dodać sekcję komunikacji z czujnikami IMU, MEMS, odległości
(wybrać jakie)
Można dodać UART do komunikacji USB (mniej ruski debug)
Przypisać fooprinty i zrobić płytkę



Sheet: /
File: uMule_board.kicad_sch

Title:

Size: A4

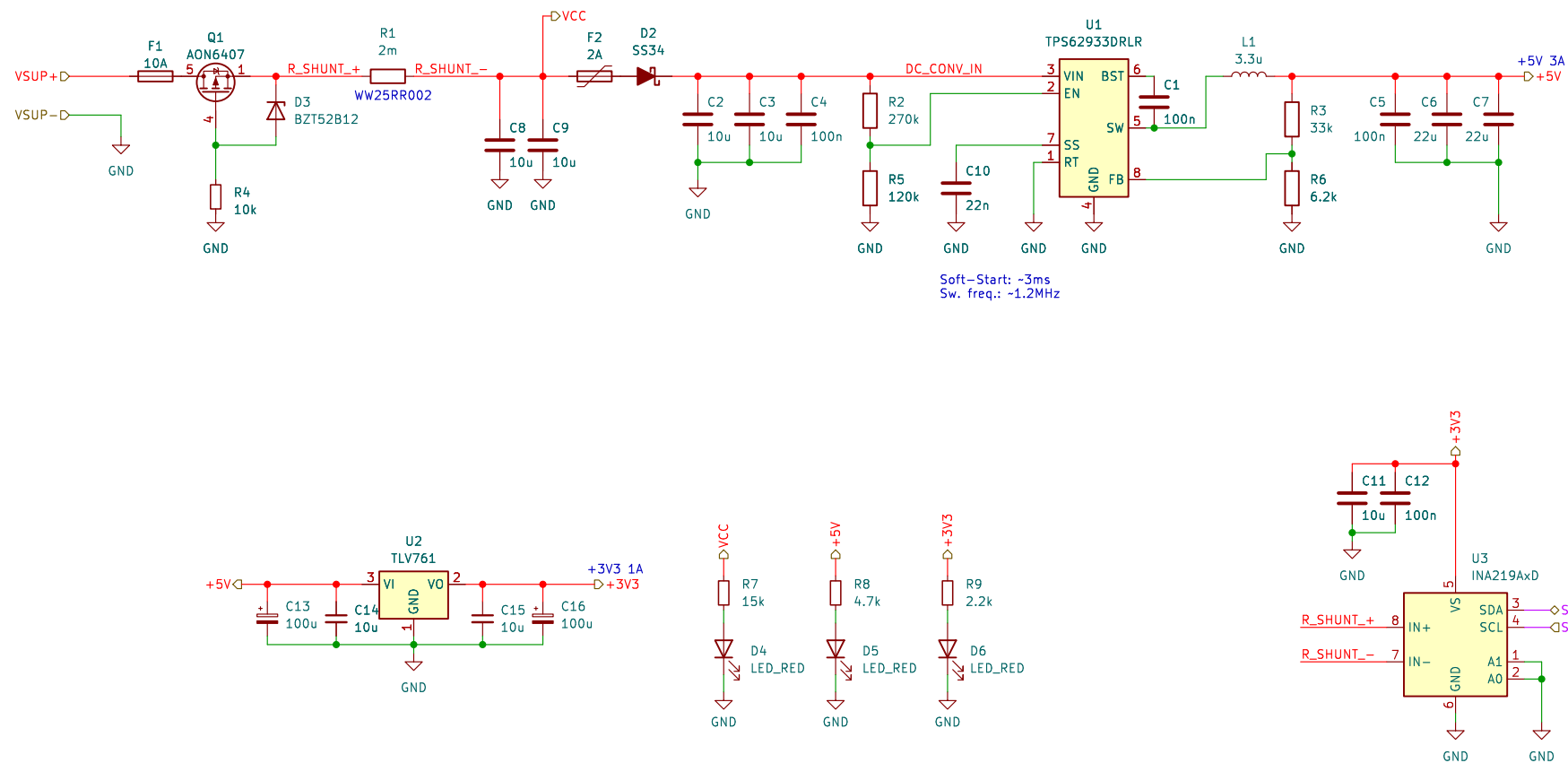
Date:

KiCad E.D.A. 9.0.6

Rev:

Id: 1/27

Chyba gotowe, dodać opisy schematu



Sheet: /Power/	
File: power.kicad_sch	
Title:	
Size: A4	Date:
KiCad E.D.A. 9.0.6	Rev: Id: 2/27

Title:

Size: A4	Date:	Rev:
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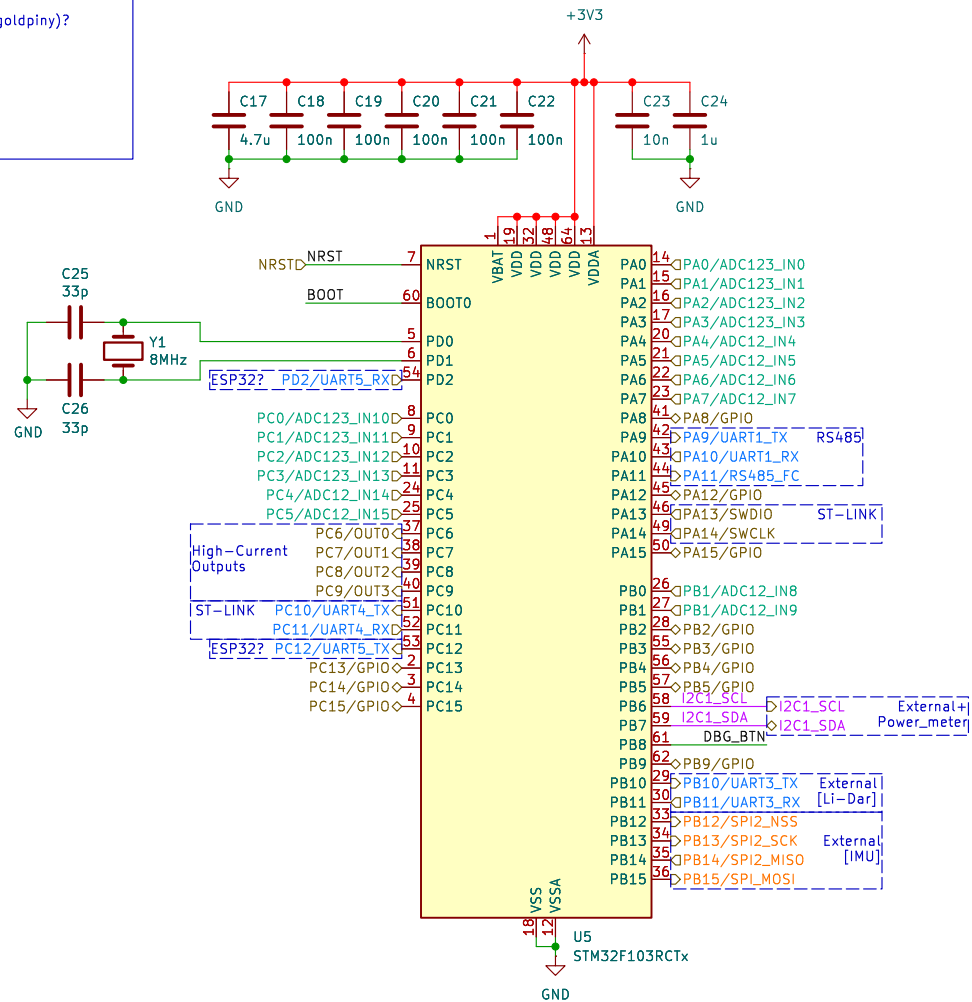
KiCad E.D.A. 9.0.6	Id: 2/27
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Rev:

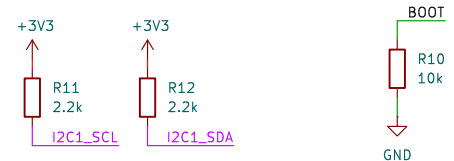
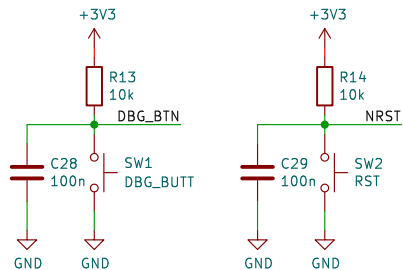
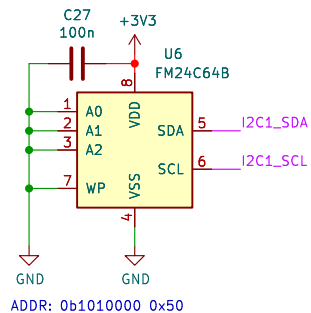
Id: 2/27

Dodać jakieś ledy do debugu (chociaż 3)

Dodać wyjścia na czujniki(Wszystkie pozostałe wyjścia na goldpiny)?



FRAM



Sheet: /MCU/
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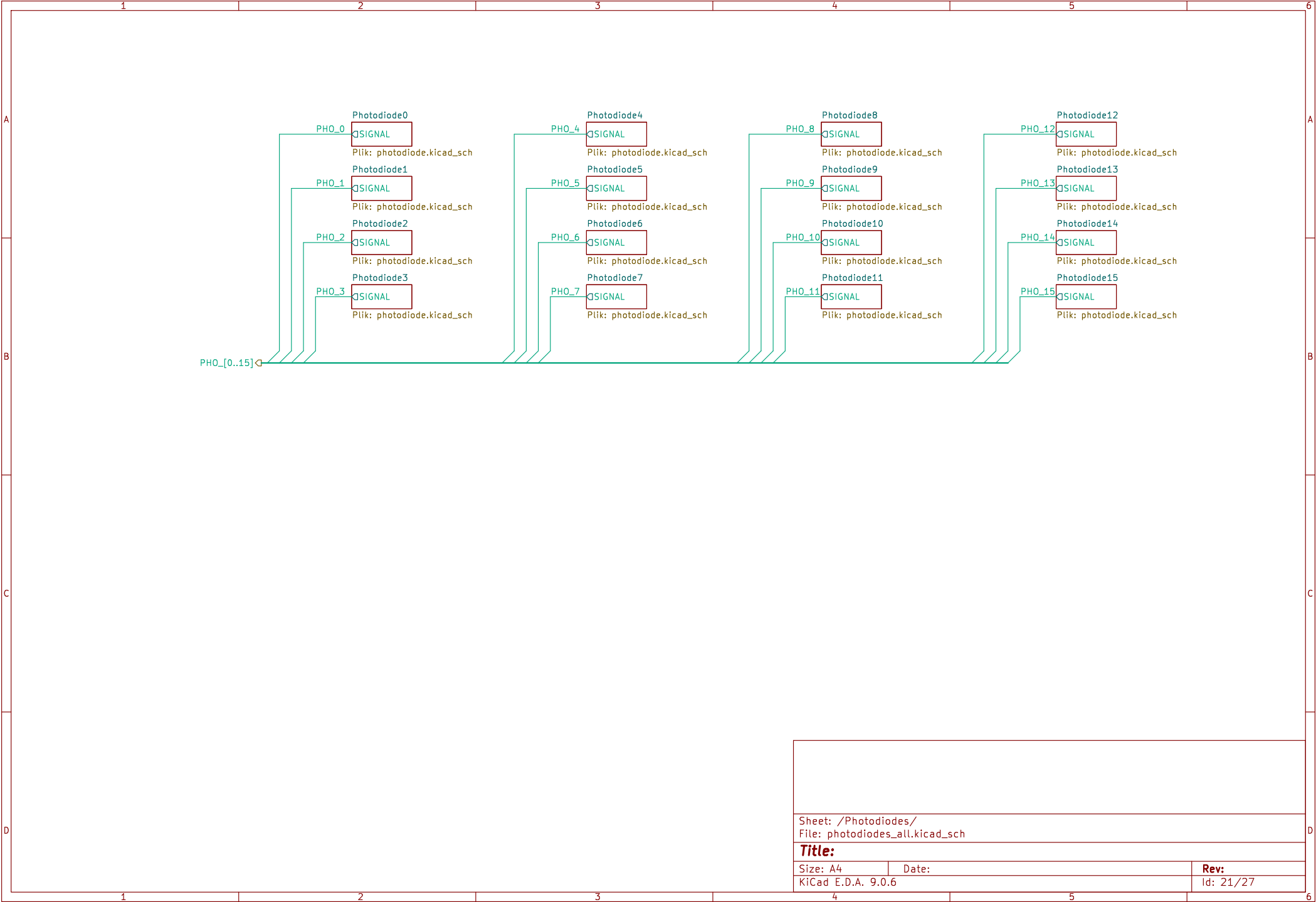
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Date:

Rev:

Id: 3/27



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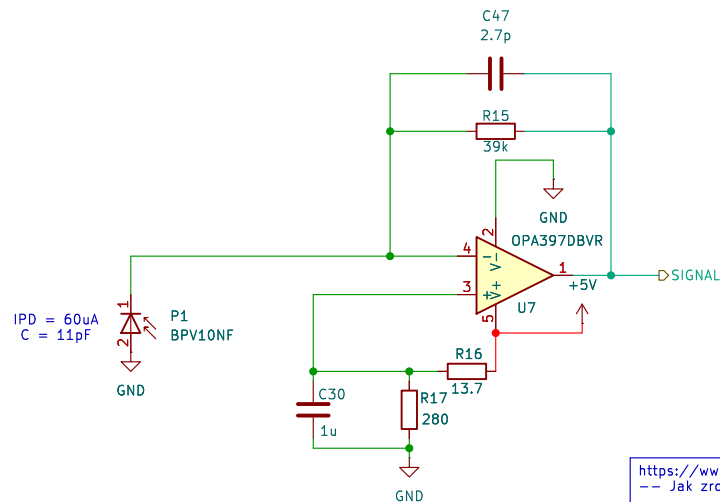
KiCad E.D.A. 9.0.6

Rev:

Id: 21/27

Można zastanowić się nad zmianą wartości rezystora R1, ale to po zmianie procka i sprawdzeniu czy będzie działać. Obecnie jest zakres 0.1V–2.4V (chyba)

$$\frac{V_{OUT(MAX)} - V_{OUT(MIN)}}{I_{IN(MAX)}} = R_1 \rightarrow \frac{4.9V - .1V}{90\mu A} = 53333.3\Omega \rightarrow 53.6k\Omega$$



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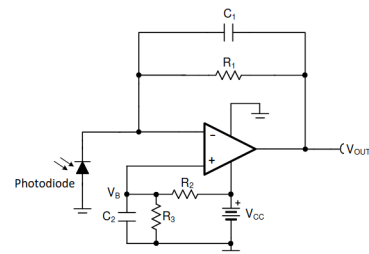


Figure 4: A bias voltage is applied to the op amp's non-inverting input to prevent saturation at the negative power supply

The output transfer function including the bias voltage is:

$$V_{OUT} = I_{PD}R_1 + V_B = I_{PD}R_1 + V_{CC}\frac{R_3}{R_3 + R_2} \quad (2)$$

KEY OPA128 SPECIFICATIONS

Bias current 75fA max
Offset voltage 500μV max
Drift 5μV/°C max
Noise 15nV/√Hz at 10kHz

Sheet: /Photodiodes/Photodiode0/
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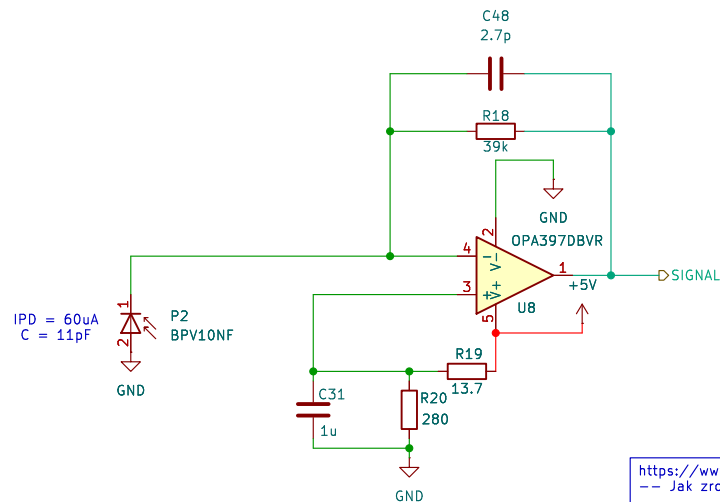
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Rev:

Id: 4/27

Można zastanowić się nad zmianą wartości rezystora R1, ale to po zmianie procka i sprawdzeniu czy będzie działać. Obecnie jest zakres 0.1V–2.4V (chyba)

$$\frac{V_{OUT(MAX)} - V_{OUT(MIN)}}{I_{IN(MAX)}} = R_1 \rightarrow \frac{4.9V - .1V}{90\mu A} = 53333.3\Omega \rightarrow 53.6k\Omega$$



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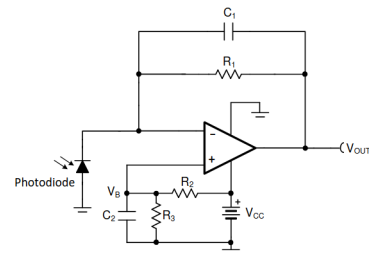


Figure 4: A bias voltage is applied to the op amp's non-inverting input to prevent saturation at the negative power supply

The output transfer function including the bias voltage is:

$$V_{OUT} = I_{PD}R_1 + V_B = I_{PD}R_1 + V_{CC}\frac{R_3}{R_3 + R_2} \quad (2)$$

KEY OPA128 SPECIFICATIONS

Bias current 75fA max
Offset voltage 500μV max
Drift 5μV/°C max
Noise 15nV/√Hz at 10kHz

Sheet: /Photodiodes/Photodiode1/
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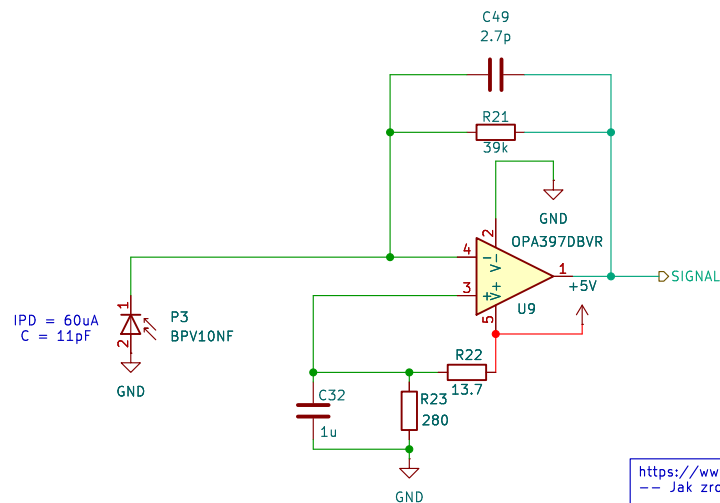
KiCad E.D.A. 9.0.6

Rev:

Id: 5/27

Można zastanowić się nad zmianą wartości rezystora R1, ale to po zmianie procka i sprawdzeniu czy będzie działać. Obecnie jest zakres 0.1V–2.4V (chyba)

$$\frac{V_{OUT(MAX)} - V_{OUT(MIN)}}{I_{IN(MAX)}} = R_1 \rightarrow \frac{4.9V - .1V}{90\mu A} = 53333.3\Omega \rightarrow 53.6k\Omega$$



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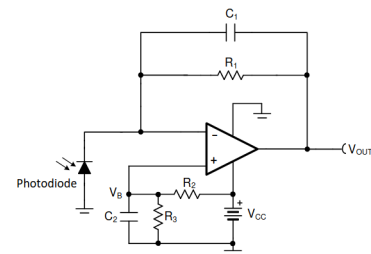


Figure 4: A bias voltage is applied to the op amp's non-inverting input to prevent saturation at the negative power supply

The output transfer function including the bias voltage is:

$$V_{OUT} = I_{PD}R_1 + V_B = I_{PD}R_1 + V_{CC}\frac{R_3}{R_3 + R_2} \quad (2)$$

KEY OPA128 SPECIFICATIONS

Bias current 75fA max
Offset voltage 500μV max
Drift 5μV/°C max
Noise 15nV/√Hz at 10kHz

Sheet: /Photodiodes/Photodiode2/
File: photodiode.kicad_sch

Title:

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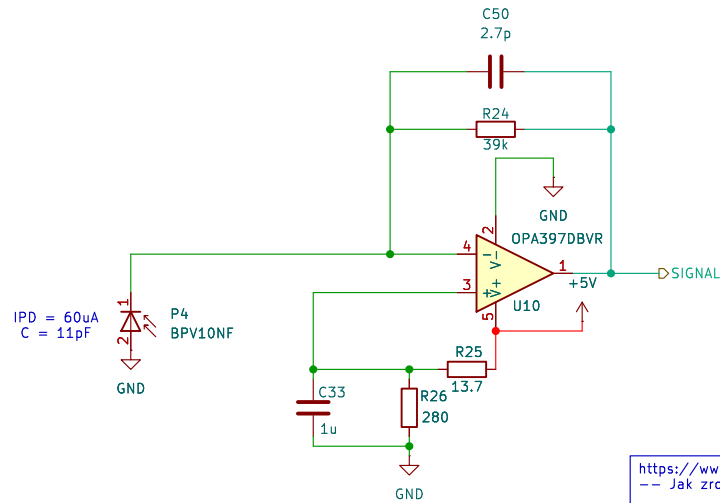
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Rev:

Id: 6/27

Można zastanowić się nad zmianą wartości rezystora R1, ale to po zmianie procka i sprawdzeniu czy będzie działać. Obecnie jest zakres 0.1V–2.4V (chyba)

$$\frac{V_{OUT(MAX)} - V_{OUT(MIN)}}{I_{IN(MAX)}} = R_1 \rightarrow \frac{4.9V - .1V}{90\mu A} = 53333.3\Omega \rightarrow 53.6k\Omega$$



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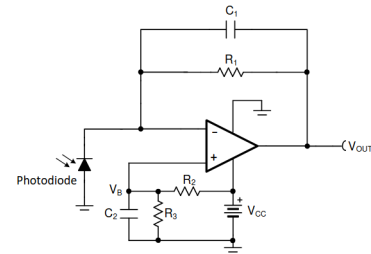


Figure 4: A bias voltage is applied to the op amp's non-inverting input to prevent saturation at the negative power supply

The output transfer function including the bias voltage is:

$$V_{OUT} = I_{PD}R_1 + V_B = I_{PD}R_1 + V_{CC}\frac{R_3}{R_3 + R_2} \quad (2)$$

KEY OPA128 SPECIFICATIONS

Bias current 75fA max
Offset voltage 500μV max
Drift 5μV/°C max
Noise 15nV/√Hz at 10kHz

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File: photodiode.kicad_sch

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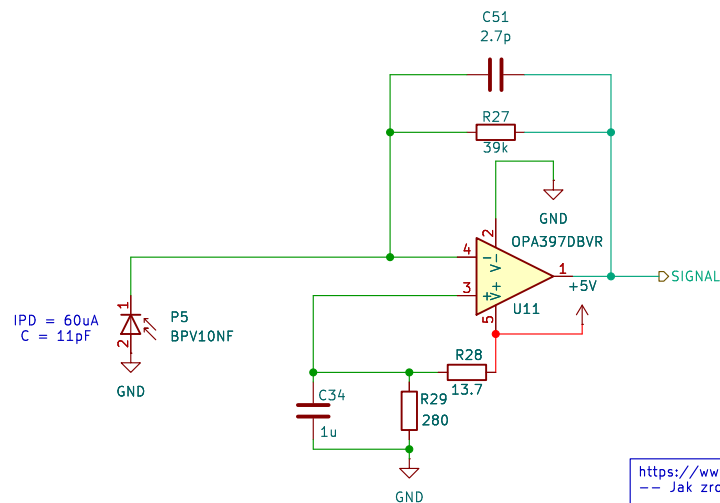
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Rev:

Id: 7/27

Można zastanowić się nad zmianą wartości rezystora R1, ale to po zmianie procka i sprawdzeniu czy będzie działać. Obecnie jest zakres 0.1V–2.4V (chyba)

$$\frac{V_{OUT(MAX)} - V_{OUT(MIN)}}{I_{IN(MAX)}} = R_1 \rightarrow \frac{4.9V - .1V}{90\mu A} = 53333.3\Omega \rightarrow 53.6k\Omega$$



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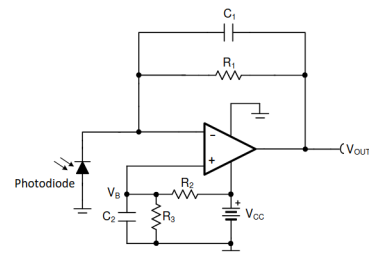


Figure 4: A bias voltage is applied to the op amp's non-inverting input to prevent saturation at the negative power supply

The output transfer function including the bias voltage is:

$$V_{OUT} = I_{PD}R_1 + V_B = I_{PD}R_1 + V_{CC}\frac{R_3}{R_3 + R_2} \quad (2)$$

KEY OPA128 SPECIFICATIONS

Bias current 75fA max
Offset voltage 500μV max
Drift 5μV/°C max
Noise 15nV/√Hz at 10kHz

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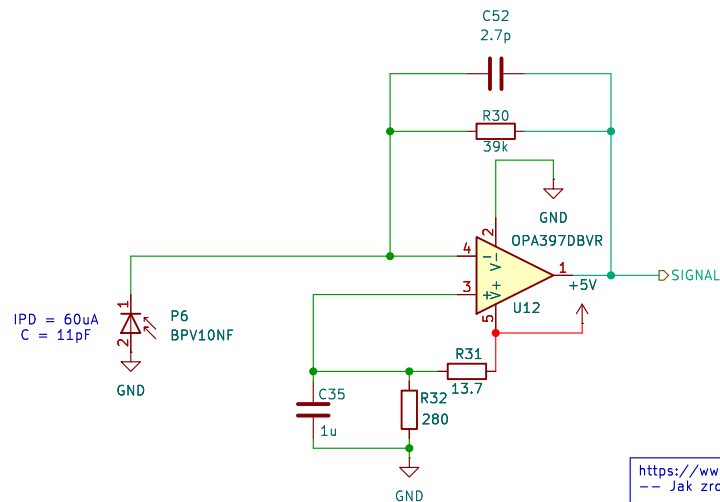
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Rev:

Id: 8/27

Można zastanowić się nad zmianą wartości rezystora R1, ale to po zmianie procka i sprawdzeniu czy będzie działać. Obecnie jest zakres 0.1V–2.4V (chyba)

$$\frac{V_{OUT(MAX)} - V_{OUT(MIN)}}{I_{IN(MAX)}} = R_1 \rightarrow \frac{4.9V - .1V}{90\mu A} = 53333.3\Omega \rightarrow 53.6k\Omega$$



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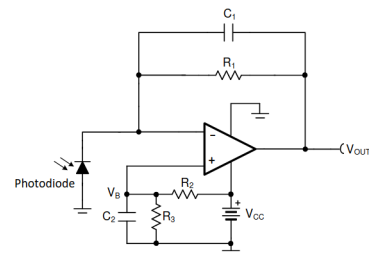


Figure 4: A bias voltage is applied to the op amp's non-inverting input to prevent saturation at the negative power supply

The output transfer function including the bias voltage is:

$$V_{OUT} = I_{PD}R_1 + V_b = I_{PD}R_1 + V_{CC}\frac{R_3}{R_3 + R_2} \quad (2)$$

KEY OPA128 SPECIFICATIONS

Bias current 75fA max
Offset voltage 500μV max
Drift 5μV/°C max
Noise 15nV/√Hz at 10kHz

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Title:

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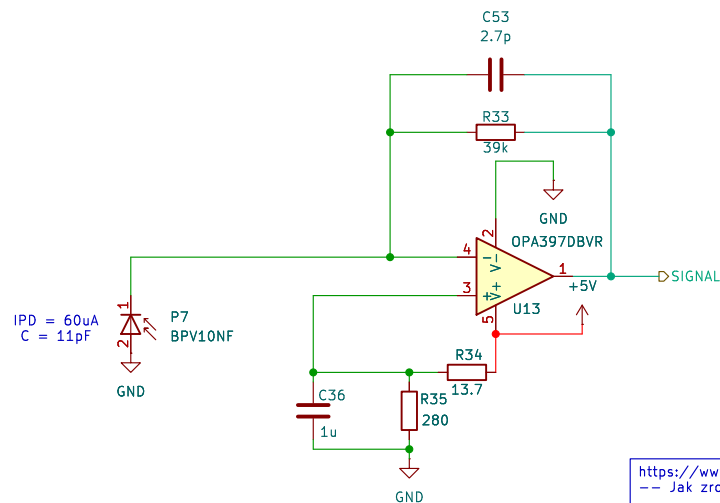
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Rev:

Id: 9/27

Można zastanowić się nad zmianą wartości rezystora R1, ale to po zmianie procka i sprawdzeniu czy będzie działać. Obecnie jest zakres 0.1V–2.4V (chyba)

$$\frac{V_{OUT(MAX)} - V_{OUT(MIN)}}{I_{IN(MAX)}} = R_1 \rightarrow \frac{4.9V - .1V}{90\mu A} = 53333.3\Omega \rightarrow 53.6k\Omega$$



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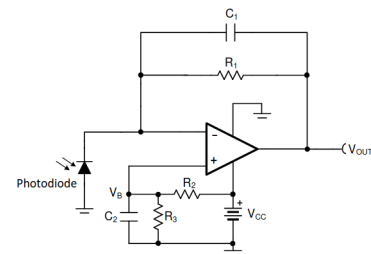


Figure 4: A bias voltage is applied to the op amp's non-inverting input to prevent saturation at the negative power supply

The output transfer function including the bias voltage is:

$$V_{OUT} = I_{PD}R_1 + V_B = I_{PD}R_1 + V_{CC}\frac{R_3}{R_3 + R_2} \quad (2)$$

KEY OPA128 SPECIFICATIONS

Bias current 75fA max
Offset voltage 500μV max
Drift 5μV/°C max
Noise 15nV/√Hz at 10kHz

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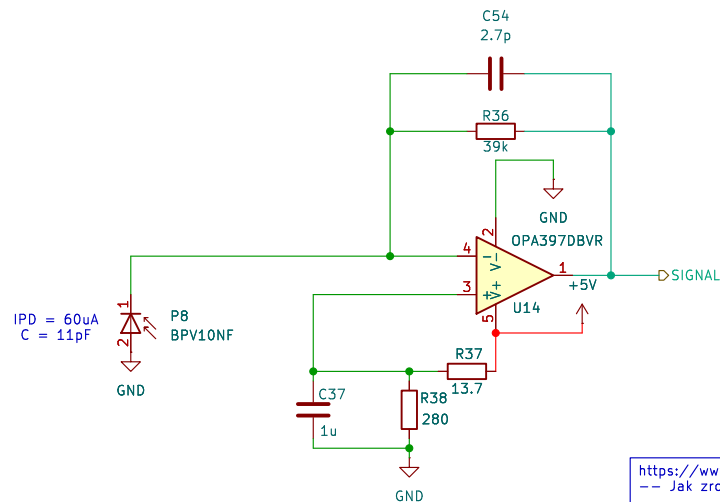
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Rev:

Id: 10/27

Można zastanowić się nad zmianą wartości rezystora R1, ale to po zmianie procka i sprawdzeniu czy będzie działać. Obecnie jest zakres 0.1V–2.4V (chyba)

$$\frac{V_{OUT(MAX)} - V_{OUT(MIN)}}{I_{IN(MAX)}} = R_1 \rightarrow \frac{4.9V - .1V}{90\mu A} = 53333.3\Omega \rightarrow 53.6k\Omega$$



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- łatwiejszy poradnik

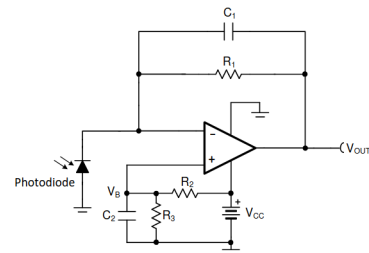


Figure 4: A bias voltage is applied to the op amp's non-inverting input to prevent saturation at the negative power supply

The output transfer function including the bias voltage is:

$$V_{OUT} = I_{PD}R_1 + V_B = I_{PD}R_1 + V_{CC}\frac{R_3}{R_3 + R_2} \quad (2)$$

KEY OPA128 SPECIFICATIONS

Bias current 75fA max
Offset voltage 500μV max
Drift 5μV/°C max
Noise 15nV/√Hz at 10kHz

Sheet: /Photodiodes/Photodiode7/
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Title:

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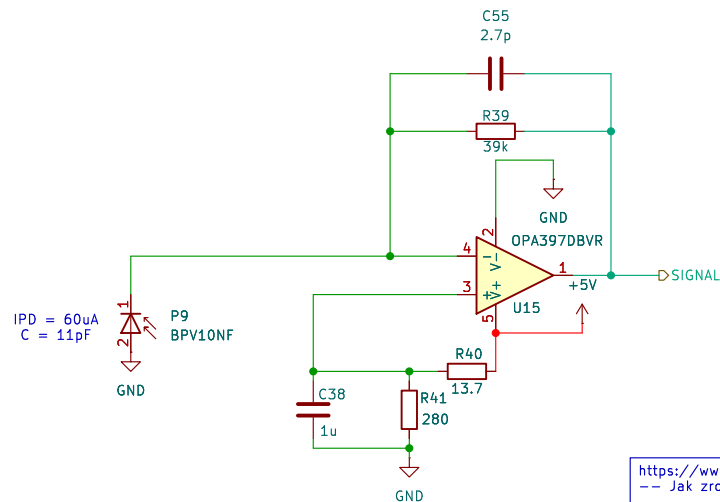
KiCad E.D.A. 9.0.6

Rev:

Id: 11/27

Można zastanowić się nad zmianą wartości rezystora R1, ale to po zmianie procka i sprawdzeniu czy będzie działać. Obecnie jest zakres 0.1V–2.4V (chyba)

$$\frac{V_{OUT(MAX)} - V_{OUT(MIN)}}{I_{IN(MAX)}} = R_1 \rightarrow \frac{4.9V - .1V}{90\mu A} = 53333.3\Omega \rightarrow 53.6k\Omega$$



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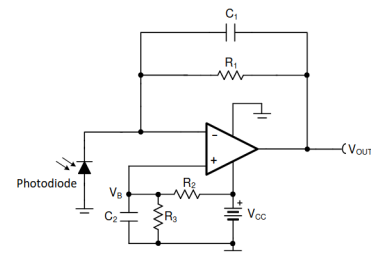


Figure 4: A bias voltage is applied to the op amp's non-inverting input to prevent saturation at the negative power supply

The output transfer function including the bias voltage is:

$$V_{OUT} = I_{PD}R_1 + V_B = I_{PD}R_1 + V_{CC}\frac{R_3}{R_3 + R_2} \quad (2)$$

KEY OPA128 SPECIFICATIONS

Bias current 75fA max
Offset voltage 500μV max
Drift 5μV/°C max
Noise 15nV/√Hz at 10kHz

Sheet: /Photodiodes/Photodiode8/
File: photodiode.kicad_sch

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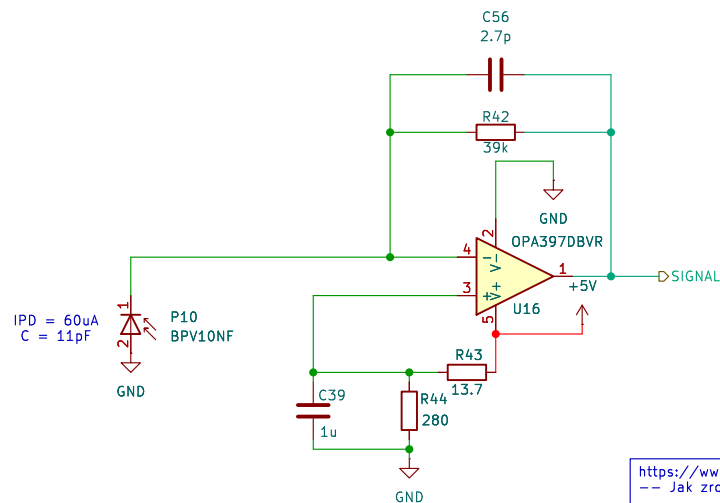
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Rev:

Id: 12/27

Można zastanowić się nad zmianą wartości rezystora R1, ale to po zmianie procka i sprawdzeniu czy będzie działać. Obecnie jest zakres 0.1V–2.4V (chyba)

$$\frac{V_{OUT(MAX)} - V_{OUT(MIN)}}{I_{IN(MAX)}} = R_1 \rightarrow \frac{4.9V - .1V}{90\mu A} = 53333.3\Omega \rightarrow 53.6k\Omega$$



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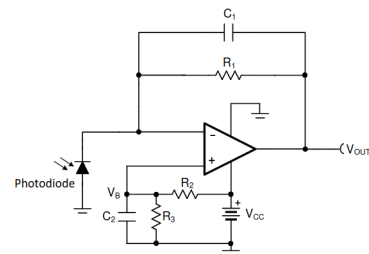


Figure 4: A bias voltage is applied to the op amp's non-inverting input to prevent saturation at the negative power supply

The output transfer function including the bias voltage is:

$$V_{OUT} = I_{PD}R_1 + V_B = I_{PD}R_1 + V_{CC}\frac{R_3}{R_3 + R_2} \quad (2)$$

KEY OPA128 SPECIFICATIONS

Bias current 75fA max
Offset voltage 500μV max
Drift 5μV/°C max
Noise 15nV/√Hz at 10kHz

Sheet: /Photodiodes/Photodiode9/
File: photodiode.kicad_sch

Title:

Size: A4

Date:

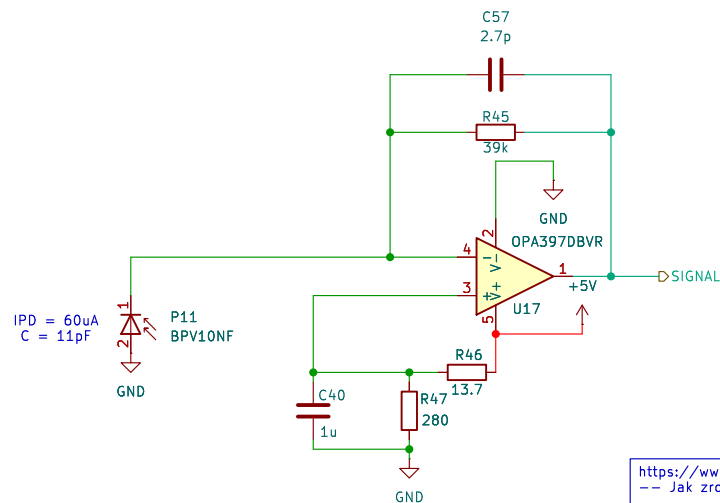
KiCad E.D.A. 9.0.6

Rev:

Id: 13/27

Można zastanowić się nad zmianą wartości rezystora R1, ale to po zmianie procka i sprawdzeniu czy będzie działać. Obecnie jest zakres 0.1V–2.4V (chyba)

$$\frac{V_{OUT(MAX)} - V_{OUT(MIN)}}{I_{IN(MAX)}} = R_1 \rightarrow \frac{4.9V - .1V}{90\mu A} = 53333.3\Omega \rightarrow 53.6k\Omega$$



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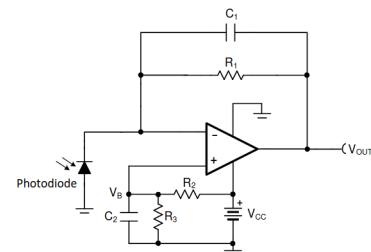


Figure 4: A bias voltage is applied to the op amp's non-inverting input to prevent saturation at the negative power supply

The output transfer function including the bias voltage is:

$$V_{OUT} = I_{PD}R_1 + V_B = I_{PD}R_1 + V_{CC}\frac{R_3}{R_3 + R_2} \quad (2)$$

KEY OPA128 SPECIFICATIONS

Bias current 75fA max
Offset voltage 500μV max
Drift 5μV/°C max
Noise 15nV/√Hz at 10kHz

Sheet: /Photodiodes/Photodiode10/
File: photodiode.kicad_sch

Title:

Size: A4

Date:

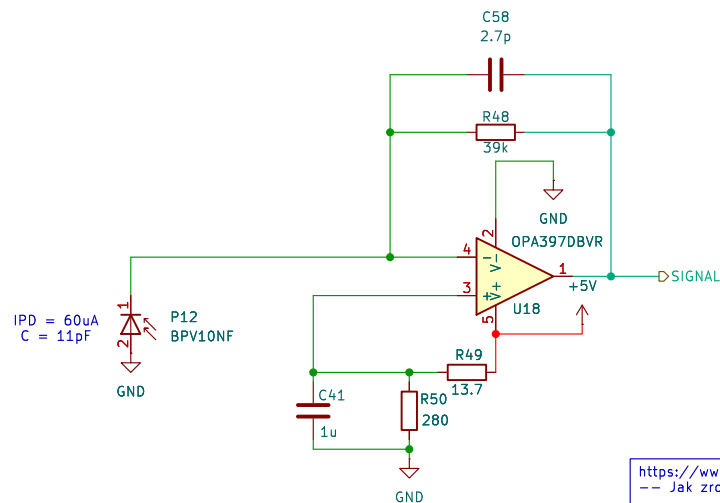
KiCad E.D.A. 9.0.6

Rev:

Id: 14/27

Można zastanowić się nad zmianą wartości rezystora R1, ale to po zmianie procka i sprawdzeniu czy będzie działać. Obecnie jest zakres 0.1V–2.4V (chyba)

$$\frac{V_{OUT(MAX)} - V_{OUT(MIN)}}{I_{IN(MAX)}} = R_1 \rightarrow \frac{4.9V - .1V}{90\mu A} = 53333.3\Omega \rightarrow 53.6k\Omega$$



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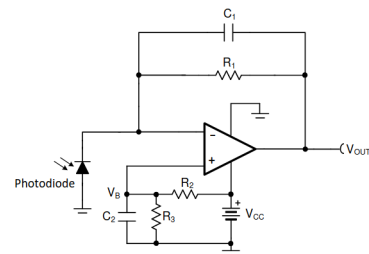


Figure 4: A bias voltage is applied to the op amp's non-inverting input to prevent saturation at the negative power supply

The output transfer function including the bias voltage is:

$$V_{OUT} = I_{PD}R_1 + V_B = I_{PD}R_1 + V_{CC}\frac{R_3}{R_3 + R_2} \quad (2)$$

KEY OPA128 SPECIFICATIONS

Bias current 75fA max
Offset voltage 500μV max
Drift 5μV/°C max
Noise 15nV/√Hz at 10kHz

Sheet: /Photodiodes/Photodiode11/
File: photodiode.kicad_sch

Title:

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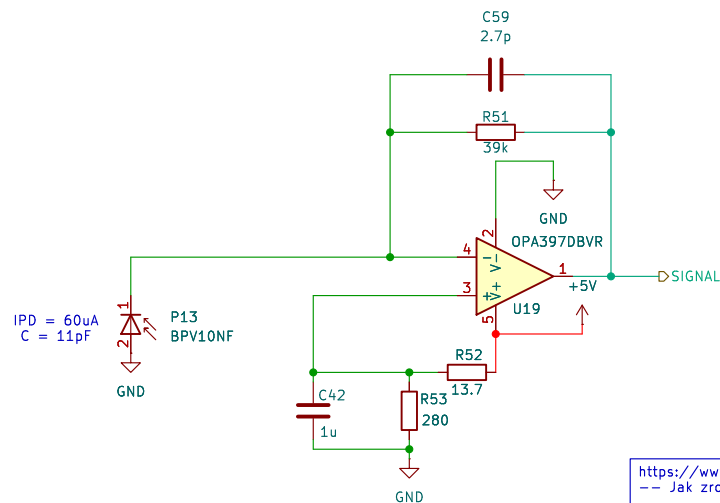
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Rev:

Id: 15/27

Można zastanowić się nad zmianą wartości rezystora R1, ale to po zmianie procka i sprawdzeniu czy będzie działać. Obecnie jest zakres 0.1V–2.4V (chyba)

$$\frac{V_{OUT(MAX)} - V_{OUT(MIN)}}{I_{IN(MAX)}} = R_1 \rightarrow \frac{4.9V - .1V}{90\mu A} = 53333.3\Omega \rightarrow 53.6k\Omega$$



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-- łatwiejszy poradnik

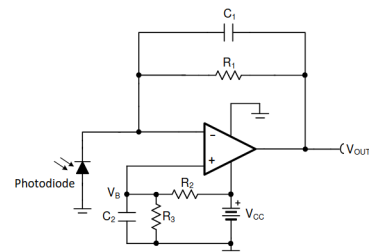


Figure 4: A bias voltage is applied to the op amp's non-inverting input to prevent saturation at the negative power supply

The output transfer function including the bias voltage is:

$$V_{OUT} = I_{PD}R_1 + V_B = I_{PD}R_1 + V_{CC}\frac{R_3}{R_3 + R_2} \quad (2)$$

KEY OPA128 SPECIFICATIONS

Bias current 75fA max
Offset voltage 500μV max
Drift 5μV/°C max
Noise 15nV/√Hz at 10kHz

Sheet: /Photodiodes/Photodiode12/
File: photodiode.kicad_sch

Title:

Size: A4

Date:

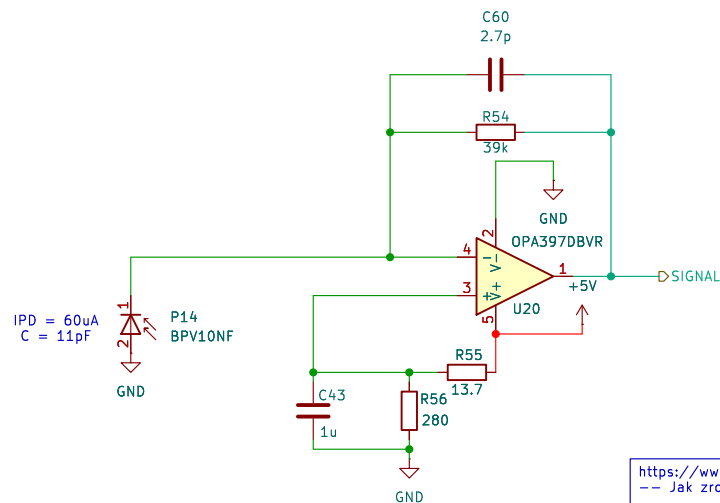
KiCad E.D.A. 9.0.6

Rev:

Id: 16/27

Można zastanowić się nad zmianą wartości rezystora R1, ale to po zmianie procka i sprawdzeniu czy będzie działać. Obecnie jest zakres 0.1V–2.4V (chyba)

$$\frac{V_{OUT(MAX)} - V_{OUT(MIN)}}{I_{IN(MAX)}} = R_1 \rightarrow \frac{4.9V - .1V}{90\mu A} = 53333.3\Omega \rightarrow 53.6k\Omega$$



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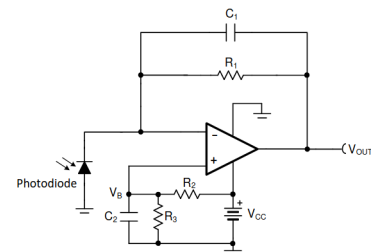


Figure 4: A bias voltage is applied to the op amp's non-inverting input to prevent saturation at the negative power supply

The output transfer function including the bias voltage is:

$$V_{OUT} = I_{PD}R_1 + V_B = I_{PD}R_1 + V_{CC}\frac{R_3}{R_3 + R_2} \quad (2)$$

KEY OPA128 SPECIFICATIONS

Bias current 75fA max
Offset voltage 500μV max
Drift 5μV/°C max
Noise 15nV/√Hz at 10kHz

Sheet: /Photodiodes/Photodiode13/
File: photodiode.kicad_sch

Title:

Size: A4

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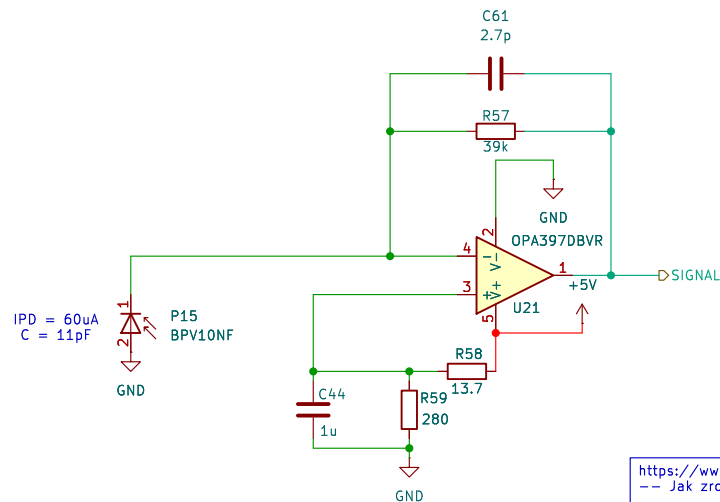
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Id: 17/27

Można zastanowić się nad zmianą wartości rezystora R1, ale to po zmianie procka i sprawdzeniu czy będzie działać. Obecnie jest zakres 0.1V–2.4V (chyba)

$$\frac{V_{OUT(MAX)} - V_{OUT(MIN)}}{I_{IN(MAX)}} = R_1 \rightarrow \frac{4.9V - .1V}{90\mu A} = 53333.3\Omega \rightarrow 53.6k\Omega$$



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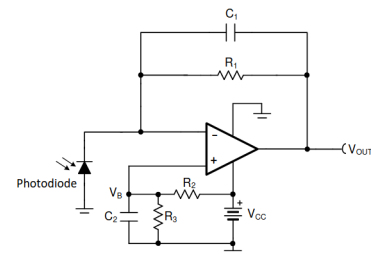


Figure 4: A bias voltage is applied to the op amp's non-inverting input to prevent saturation at the negative power supply

The output transfer function including the bias voltage is:

$$V_{OUT} = I_{PD}R_1 + V_B = I_{PD}R_1 + V_{CC}\frac{R_3}{R_3 + R_2} \quad (2)$$

KEY OPA128 SPECIFICATIONS

Bias current 75fA max
Offset voltage 500μV max
Drift 5μV/°C max
Noise 15nV/√Hz at 10kHz

Sheet: /Photodiodes/Photodiode14/
File: photodiode.kicad_sch

Title:

Size: A4

Date:

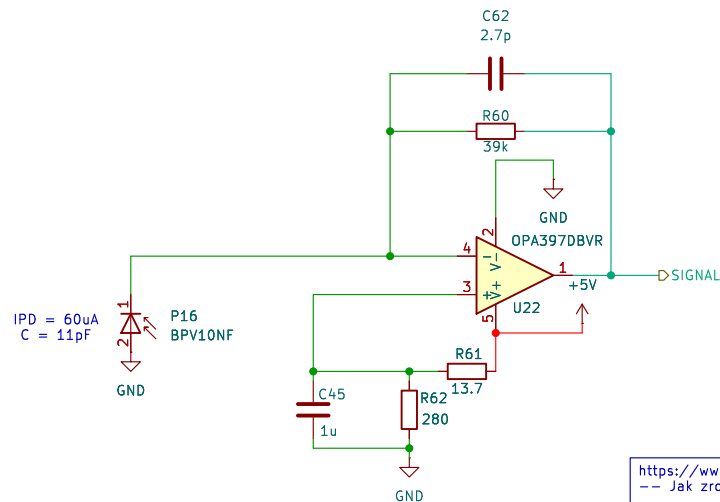
KiCad E.D.A. 9.0.6

Rev:

Id: 18/27

Można zastanowić się nad zmianą wartości rezystora R1, ale to po zmianie procka i sprawdzeniu czy będzie działać. Obecnie jest zakres 0.1V–2.4V (chyba)

$$\frac{V_{OUT(MAX)} - V_{OUT(MIN)}}{I_{IN(MAX)}} = R_1 \rightarrow \frac{4.9V - .1V}{90\mu A} = 53333.3\Omega \rightarrow 53.6k\Omega$$



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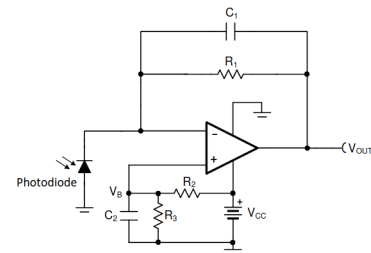


Figure 4: A bias voltage is applied to the op amp's non-inverting input to prevent saturation at the negative power supply

The output transfer function including the bias voltage is:

$$V_{OUT} = I_{PD}R_1 + V_B = I_{PD}R_1 + V_{CC}\frac{R_3}{R_3 + R_2} \quad (2)$$

KEY OPA128 SPECIFICATIONS

Bias current 75fA max
Offset voltage 500μV max
Drift 5μV/°C max
Noise 15nV/√Hz at 10kHz

Sheet: /Photodiodes/Photodiode15/
File: photodiode.kicad_sch

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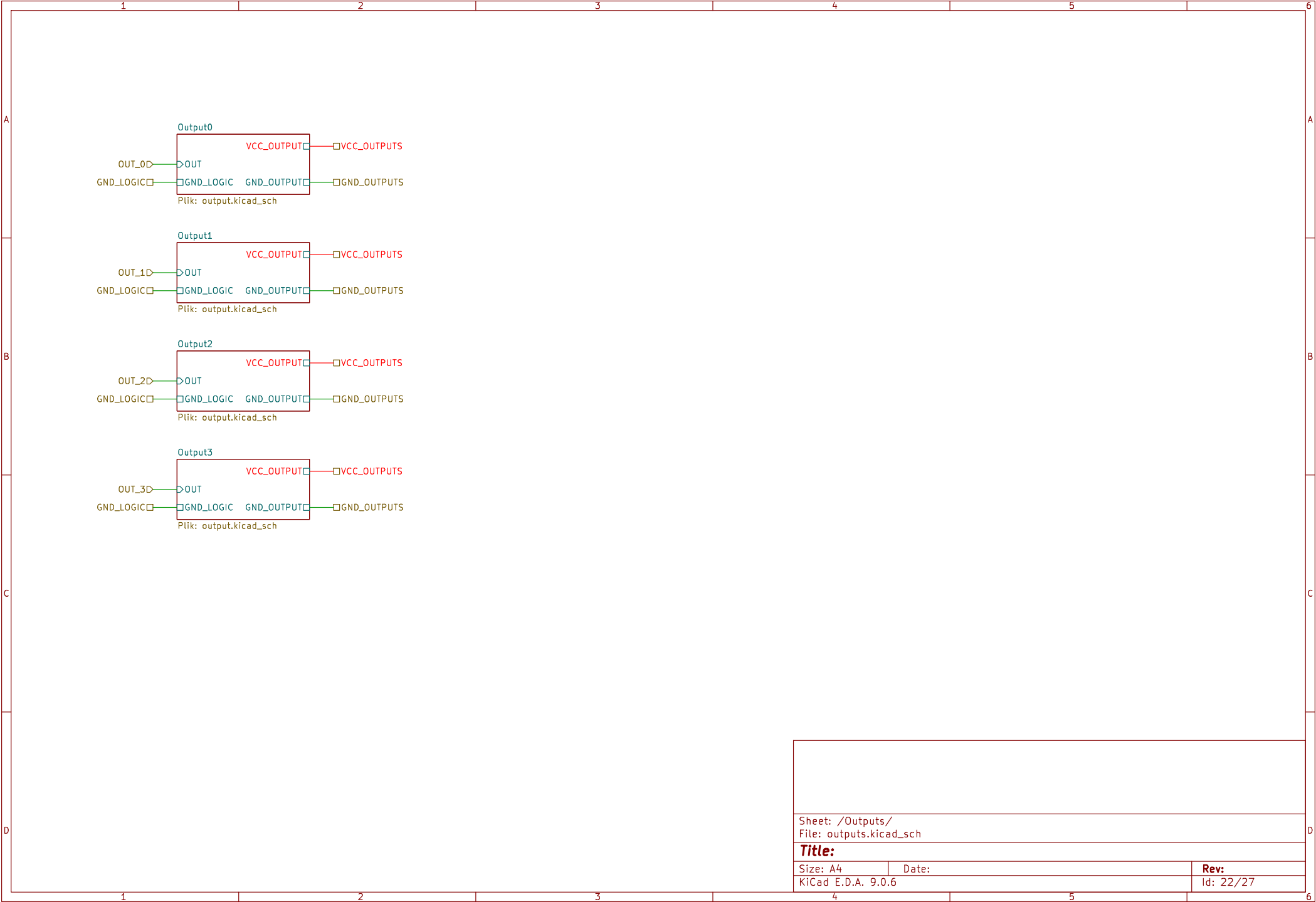
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Id: 19/27



Plik: output.kicad_sch

Output2

OUT

GND_LOGIC

VCC_OUTPUT

GND_OUTPUT

OUT_2

GND_LOGIC

VCC_OUTPUTS

GND_OUTPUTS

Plik: output.kicad_sch

Output3

OUT

GND_LOGIC

VCC_OUTPUT

GND_OUTPUT

OUT_3

GND_LOGIC

VCC_OUTPUTS

GND_OUTPUTS

Plik: output.kicad_sch

Sheet: /Outputs/
File: outputs.kicad_sch

Title:

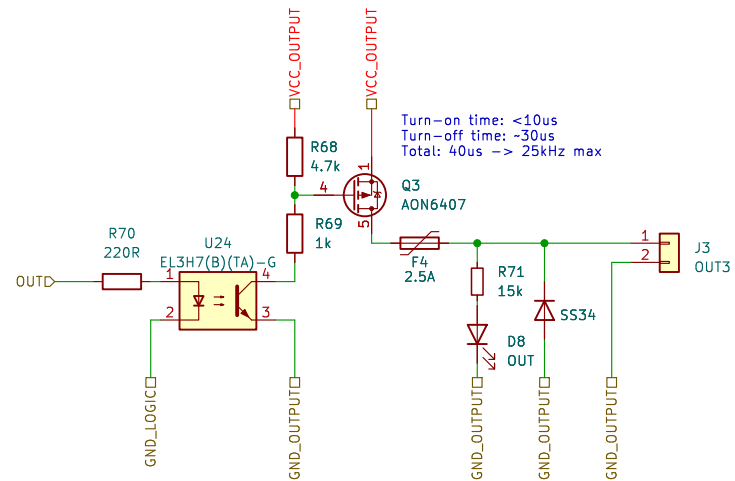
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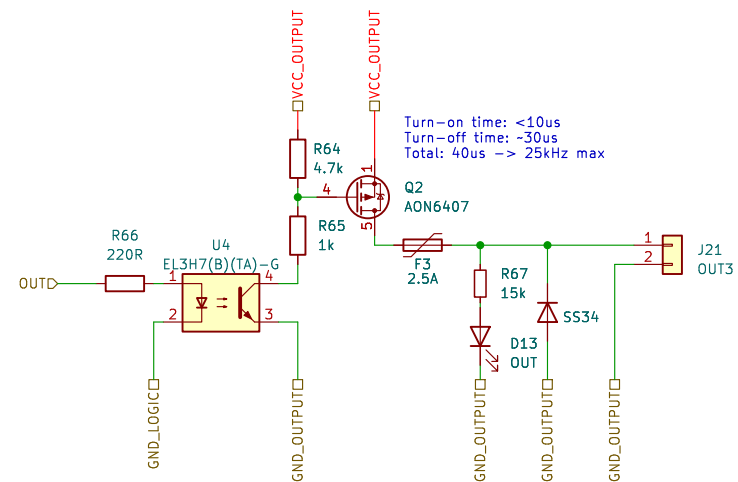
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KiCad E.D.A. 9.0.6

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Id: 20/27



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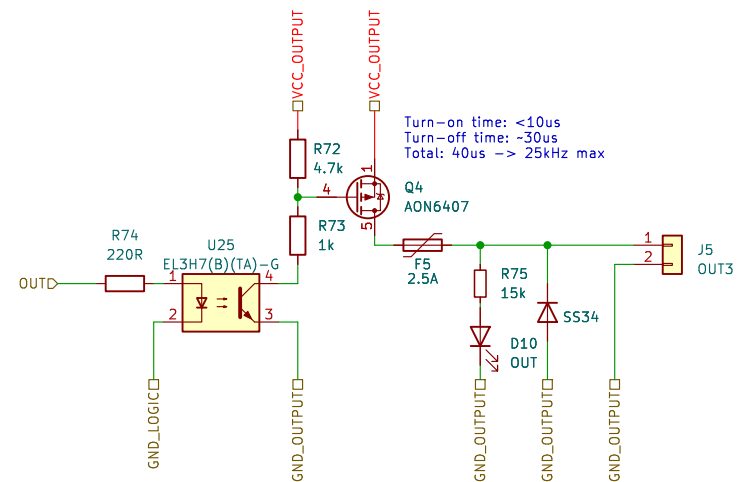
Title:

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Id: 23/27



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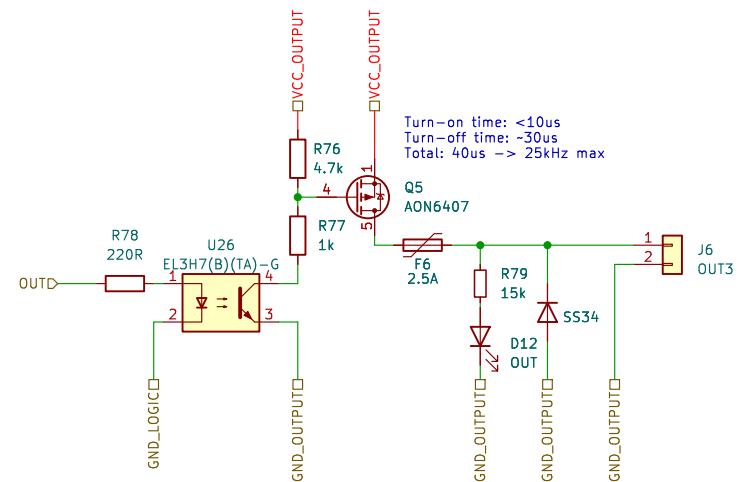
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Id: 24/27



Sheet: /Outputs/Output3/
File: output.kicad_sch

Title:

Size: A4 Date:

KiCad E.D.A. 9.0.6

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