EEE-313 Project

Electronic Compass Showing North and South

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Specifications of Design Phase:

Circuit Design and Signal Output with Border Voltage Values:

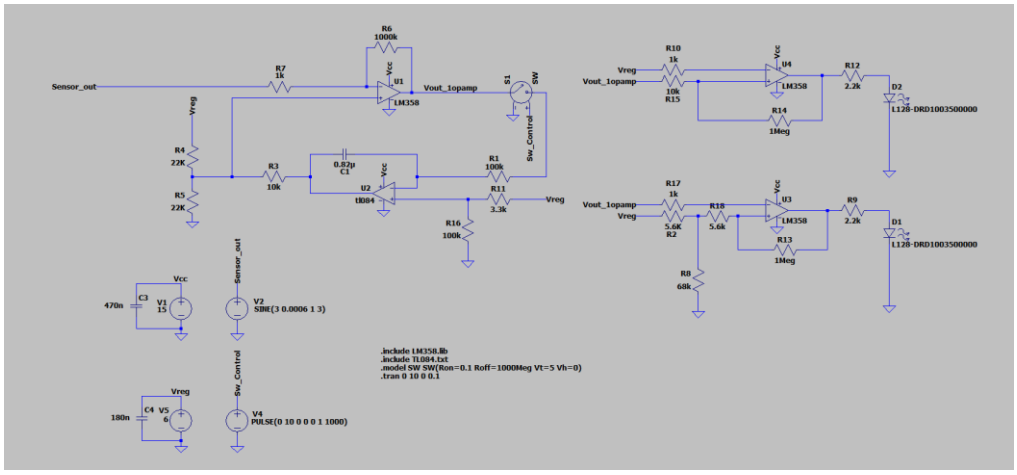

Figure 1: Analog Compass Circuit

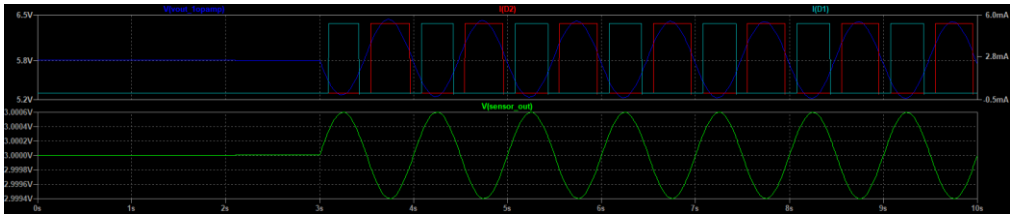

Figure 2: Various Voltage of Circuit With LEDS Currents at 3V Offset

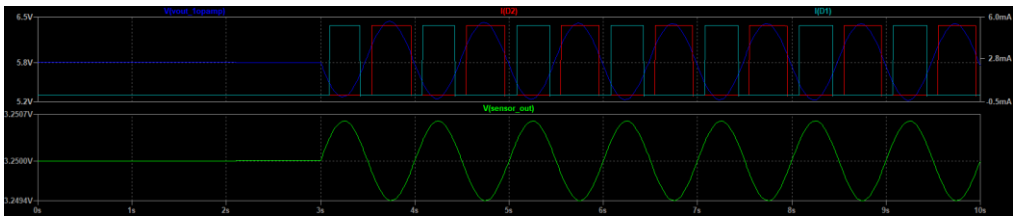

Figure 3: Various Voltage of Circuit With LEDS Currents at 3.25V Offset

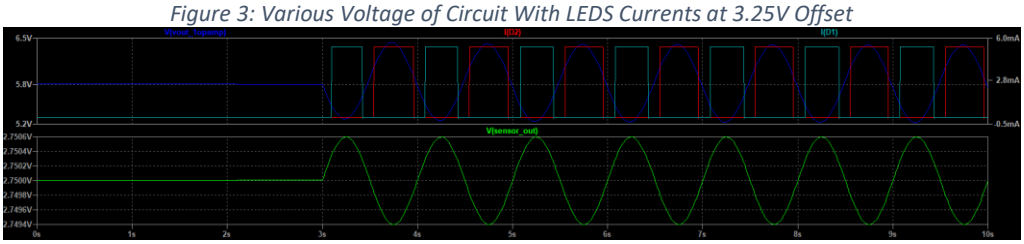

Figure 4: Various Voltage of Circuit With LEDS Currents at 2.75V Offset

Circuit is working in the sensor border voltage which are 2.75V and 3.25V same as at 3 voltage value.

1. **Current Consumption from +15v Supply < 30 Ma**

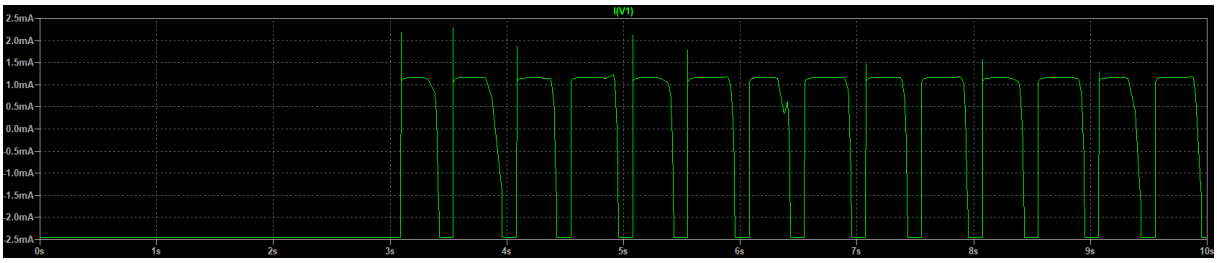

Figure 5: Vcc Current

Vcc current is lower than 30Ma.

2. **It Should Operate for at Least Three Minutes After Auto-zero.**

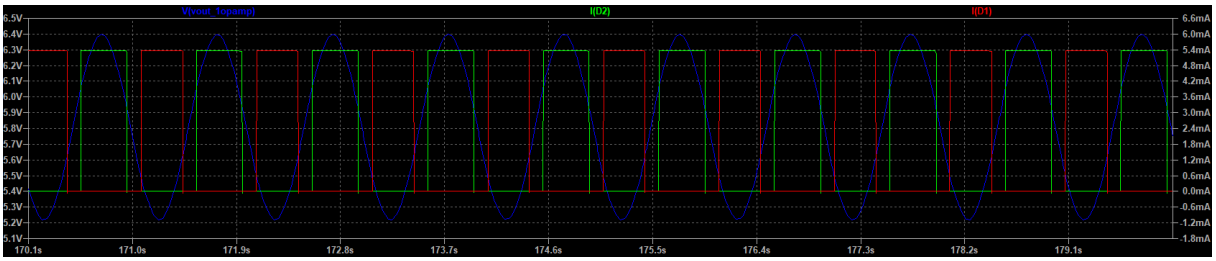

Figure 6: Amplifier Opamp Output and 2 LEDS Currents After in Range 170 and 180 seconds

Leds are working at about 180 seconds.

3. **Leds Should Turn On Within ± 45° of North or South.**

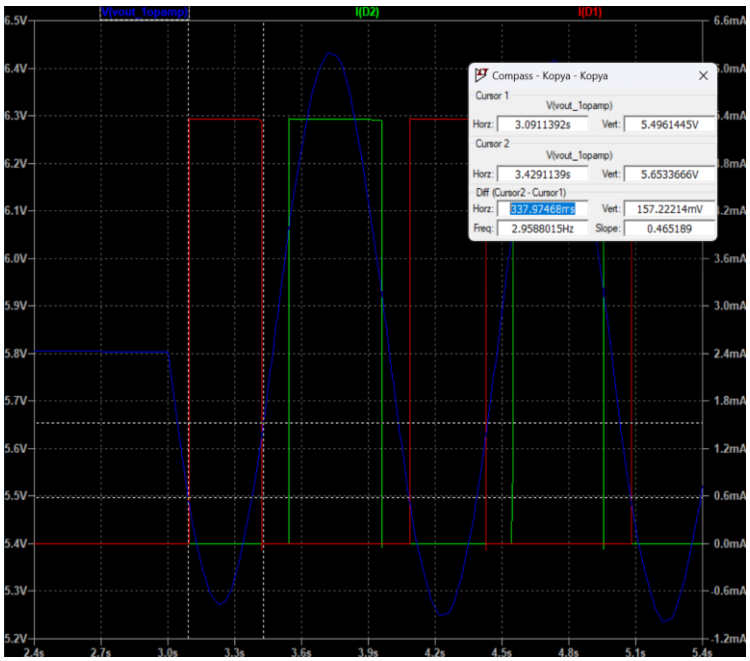

Figure 7: Amplifier Opamp Output and 2 LEDS Currents

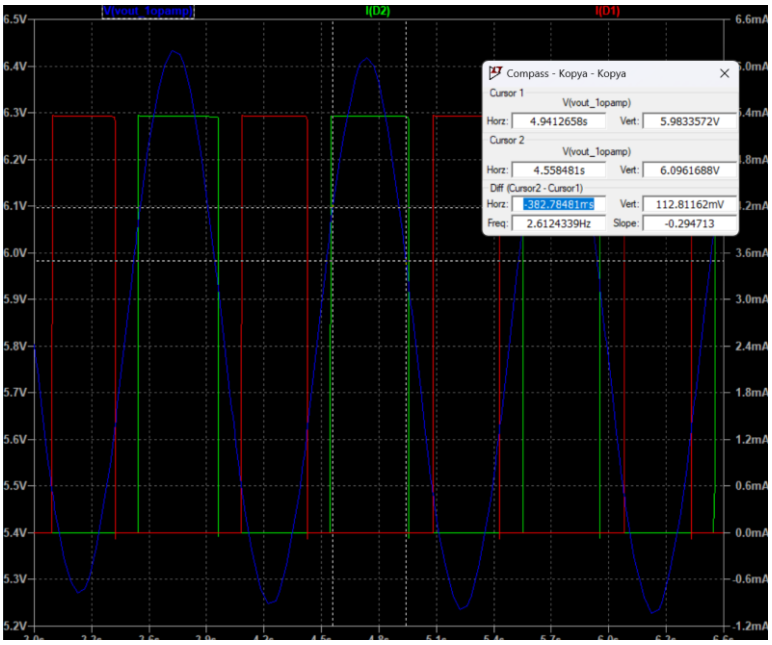

Figure 8: Amplifier Opamp Output and 2 LEDS Currents and Compass Direction Measurement

It can be seen that, leds are not working at quarter of the cycle in 2 place which are represents the west and east directions, and leds are working at around of the peaks of the signal with are represents north and sourth directions.

4. Leds Should Not Flicker While Turning On or Off (Should Have Some Hysteresis).

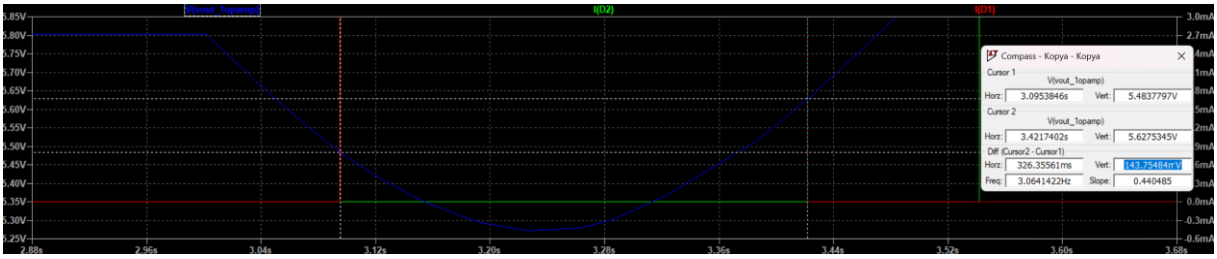

Figure 9: Hysteresis Effect Voltage Difference on Red LED

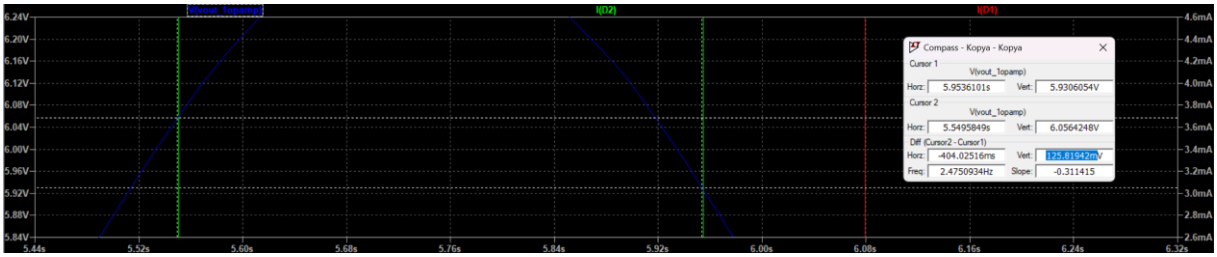

Figure 10: Hysteresis Effect Voltage Difference on Green LED

It can be seen that, Hysteresis feedback creates voltage difference so that leds are not flicker at the reference voltages.

Diptrace:

#	RefDes	Value	Name	Pattern
1	C1	470n	Capacitor, Ceramic	CAP200
2	C2	180n	Capacitor, Ceramic	CAP200
3	C3	0.82u	Capacitor, Ceramic	CAP200
4	D1		LED-3mm Round Red	LED-3mm
5	D3		LED-3mm Round Red	LED-3mm
6	J1		Connection	Connector
7	J2		Connection	Connector
8	Q1	UGN3503U	UGN3503U	UGN3503
9	R1	1k	Resistor320	RS320
10	R2	1Meg	Resistor320	RS320
11	R3	100K	Resistor320	RS320
12	R4	3.3K	Resistor320	RS320
13	R5	100K	Resistor320	RS320
14	R6	10K	Resistor320	RS320
15	R7	22K	Resistor320	RS320
16	R8	22K	Resistor320	RS320
17	R9	1K	Resistor320	RS320
18	R10	10k	Resistor320	RS320
19	R11	1Meg	Resistor320	RS320
20	R12	2.2K	Resistor320	RS320
21	R13	1K	Resistor320	RS320
22	R14	5.6K	Resistor320	RS320
23	R15	1Meg	Resistor320	RS320
24	R16	5.6K	Resistor320	RS320
25	R17	68K	Resistor320	RS320
26	R18	2.2K	Resistor320	RS320
27	S1		DTS-6, Pushbutton Sw	DTS-6
28	U1	7806	7806	TO250
29	U2	LM358	LM358	DIP8
30	U3	LM358	LM358	DIP8
31	U4	TL064	TL084	DIP14

Figure 11: DipTrace Companent list White

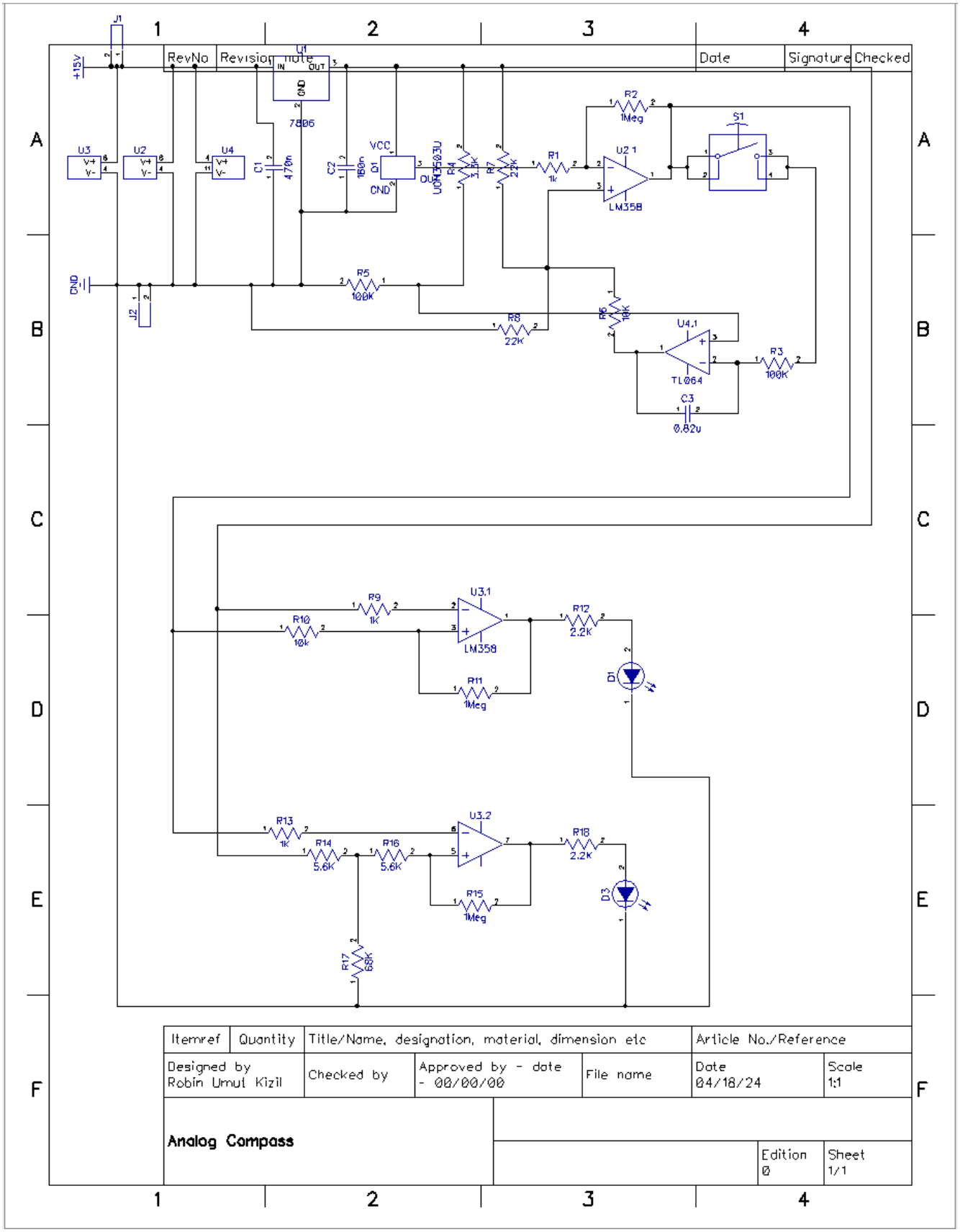

Figure 12: DipTrace Circuit on A4 White

#	RefDes	Value	Name	Pattern
1	C1	470n	Capacitor, Ceramic	CAP200
2	C2	180n	Capacitor, Ceramic	CAP200
3	C3	0.82u	Capacitor, Ceramic	CAP200
4	D1		LED-3mm Round Red	LED-3mm
5	D3		LED-3mm Round Red	LED-3mm
6	J1		Connection	Connector
7	J2		Connection	Connector
8	Q1	UGN3503U	UGN3503U	UGN3503
9	R1	1k	Resistor320	RS320
10	R2	1Meg	Resistor320	RS320
11	R3	100K	Resistor320	RS320
12	R4	3.3K	Resistor320	RS320
13	R5	100K	Resistor320	RS320
14	R6	10K	Resistor320	RS320
15	R7	22K	Resistor320	RS320
16	R8	22K	Resistor320	RS320
17	R9	1K	Resistor320	RS320
18	R10	10k	Resistor320	RS320
19	R11	1Meg	Resistor320	RS320
20	R12	2.2K	Resistor320	RS320
21	R13	1K	Resistor320	RS320
22	R14	5.6K	Resistor320	RS320
23	R15	1Meg	Resistor320	RS320
24	R16	5.6K	Resistor320	RS320
25	R17	68K	Resistor320	RS320
26	R18	2.2K	Resistor320	RS320
27	S1		DTS-6, Pushbutton Sw	DTS-6
28	U1	7806	7806	TO250
29	U2	LM358	LM358	DIP8
30	U3	LM358	LM358	DIP8
31	U4	TL064	TL084	DIP14

Figure 13: DipTrace Companent list Black

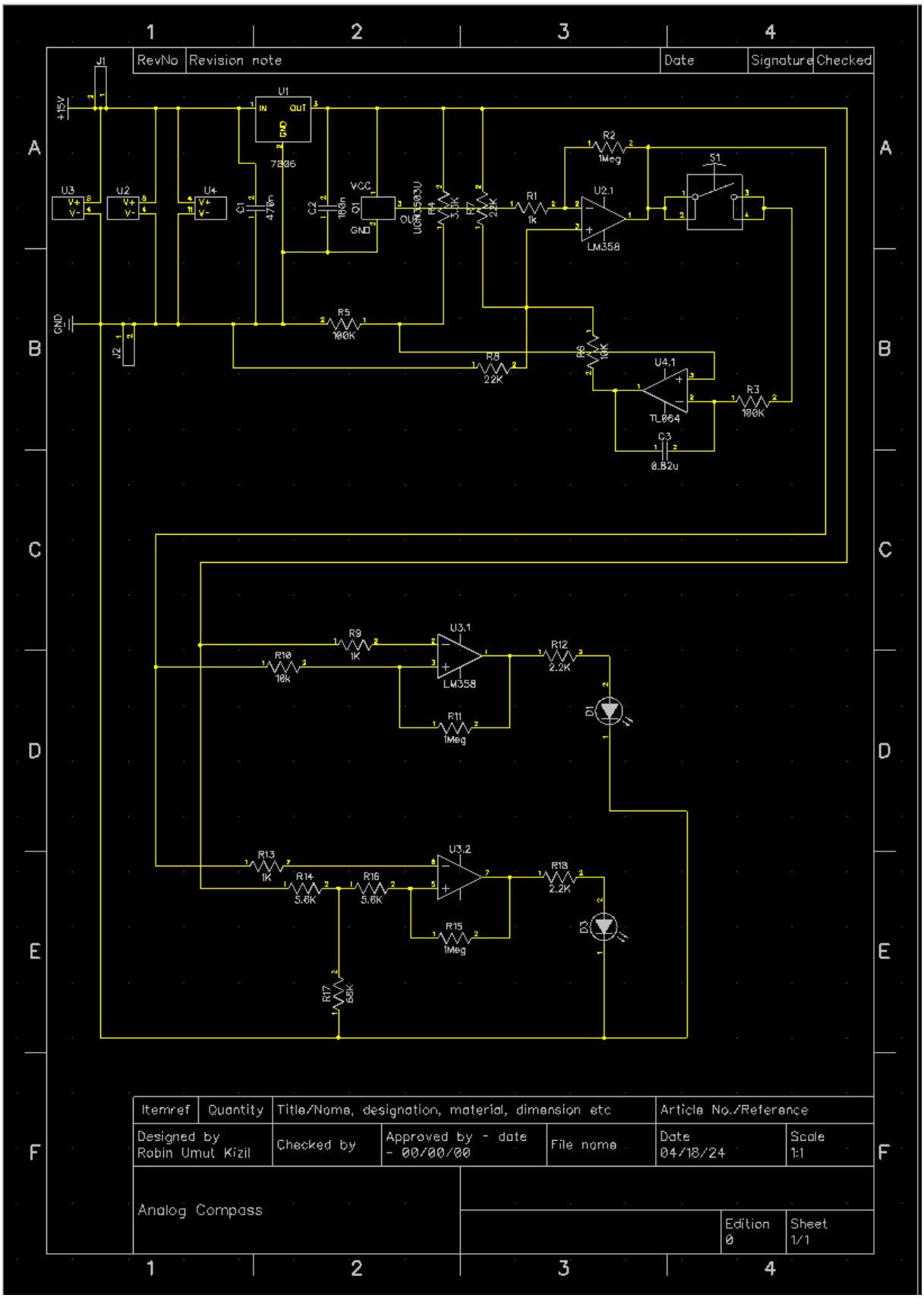

Figure 14: DipTrace Circuit on A4 Black