

Digital Communications Lab

Laboratory report submitted for the partial fulfillment
of the requirements for the degree of

Bachelor of Technology
in
Electronics and Communication Engineering

by

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Contents

Chapter	Page
1 Experiment - 08	1
1.1 Observations	4
1.1.1 Result Screenshots	4
1.2 Precautions	12

Chapter 1

Experiment - 08

Experiment No.: 08

1 Aim

1. Implement BPSK Modulation and carrier recovery using square-loop method.

2 Apparatus Used

- | | | | |
|--------------------------------|----------------------------|---------------|------------------------|
| 1. ICs: LM741 | 5. 7476 (J-K Flip Flop IC) | 8. 565 (PLL) | 11. BJT [BC547, BC557] |
| 2. Diode | 6. Resistance | 9. Capacitor | 12. Breadboard |
| 3. DC power supply | 7. Connecting wires | 10. DSO Probe | 13. Function Generator |
| 4. Digital signal oscilloscope | | | |

3 Theory

3.1 Connection Diagram

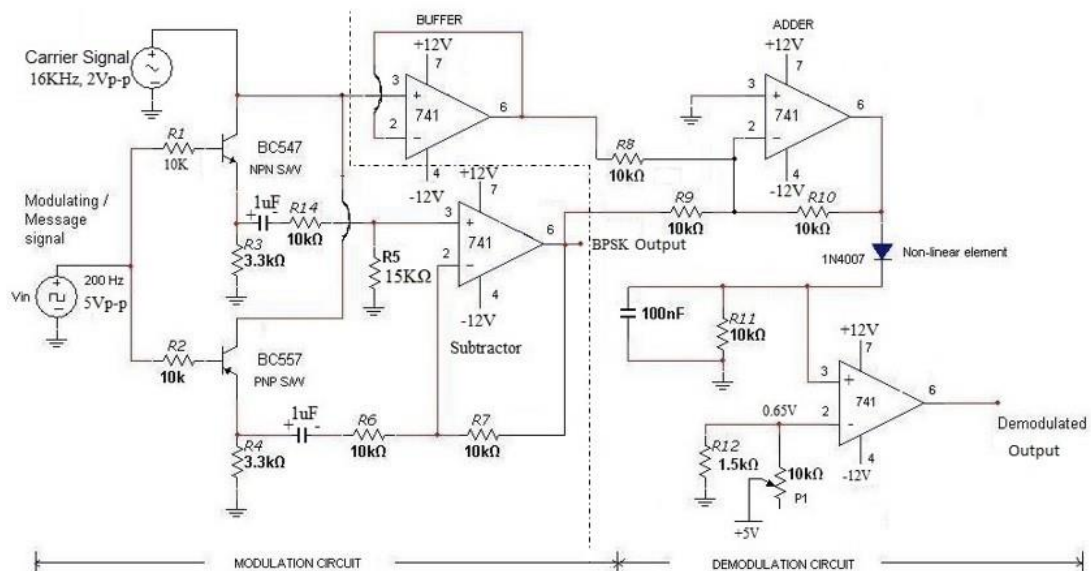
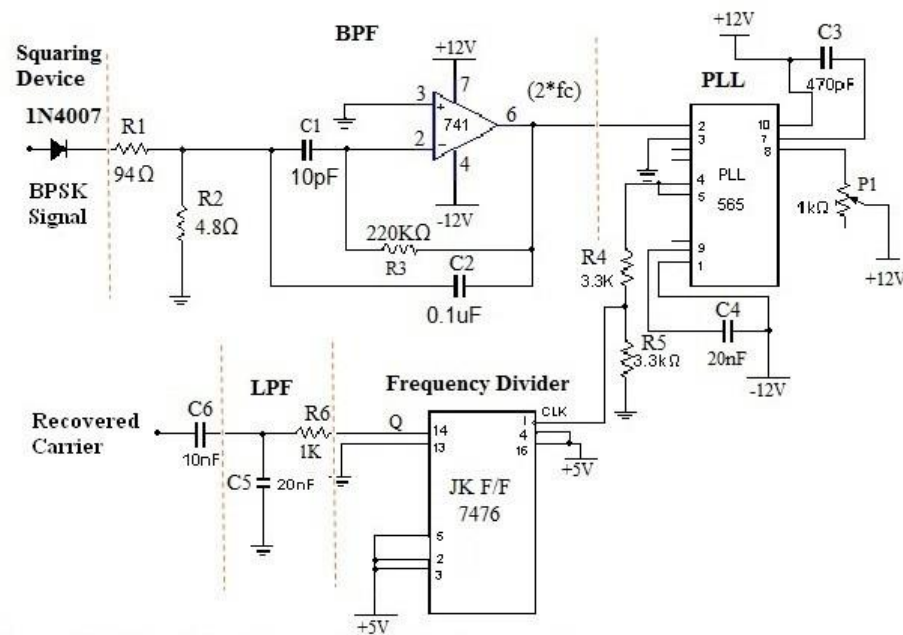


Figure 1: BPSK Modulation and Demodulation

4 Procedure

1. Connect the circuit as given in Figure 1.
2. Give Square wave as a message signal of $5V_{pp}$ and 200Hz at the base of NPN and PNP BJT switches as shown in Figure 1. Give sinusoidal carrier signal of 16KHz and $2V_{pp}$ at the collector of NPN BJT switch.
3. Observe BPSK Modulated output after Subtractor. Draw it on your copy.
4. Observe BPSK Demodulated output and draw it in your copy, compare it with message signal.
5. Now connect circuit as shown in Fig. 2.



Note:- First connection LM565 circuit. Now adjust the Potentiometer P1 to get the free running frequency 32 KHz. Then you will complete remaining circuit.

Figure 2: Carrier Recovery

6. Give BPSK Modulated signal at the input of diode (Fig 2). Observe output after each stage of Figure 2 and compare recovered carrier with original carrier signal. Draw it in your copy with proper specification.
7. Now disconnect carrier input at demodulator circuit (Fig 1) and connect recovered carrier signal.
8. Observe demodulated output and draw it.

5 Analysis of Results

6 Conclusions

Precautions

1. Check the connections before switching on the kit.
2. Connections should be done properly.
3. Observation should be taken properly.

1.1 Observations

1.1.1 Result Screenshots

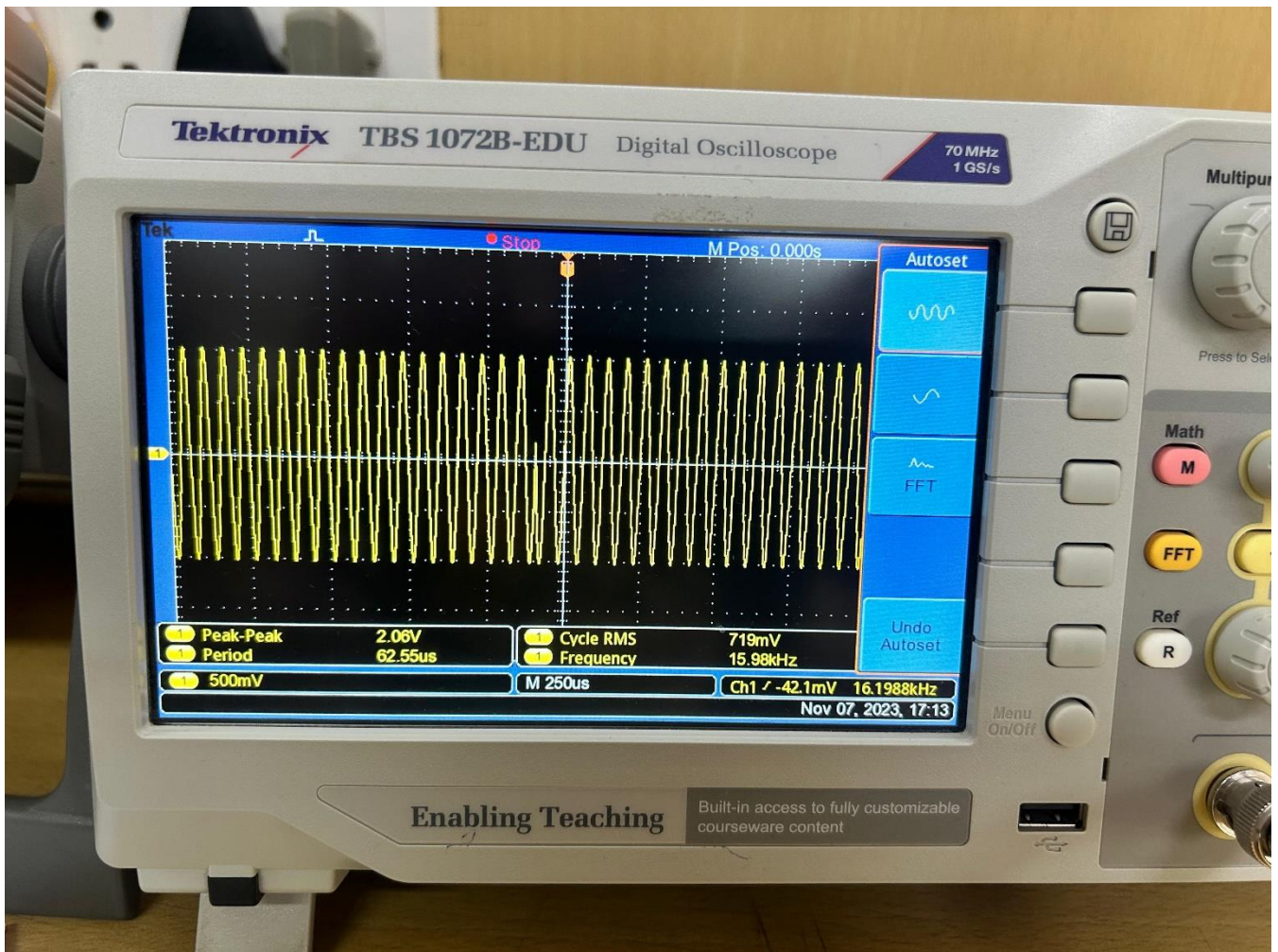


Figure 1.1: Output of BPSK

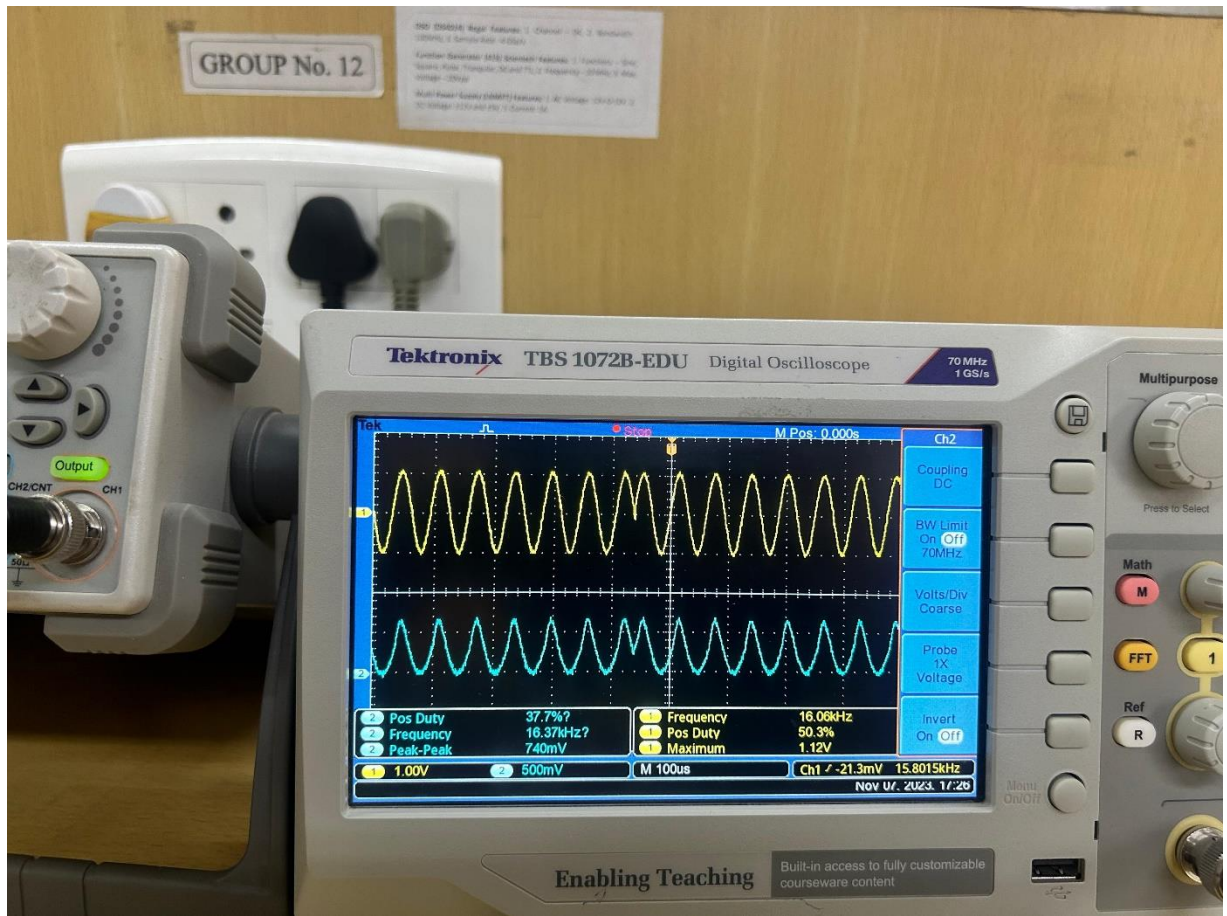


Figure 1.2: BPSK and Diode Output

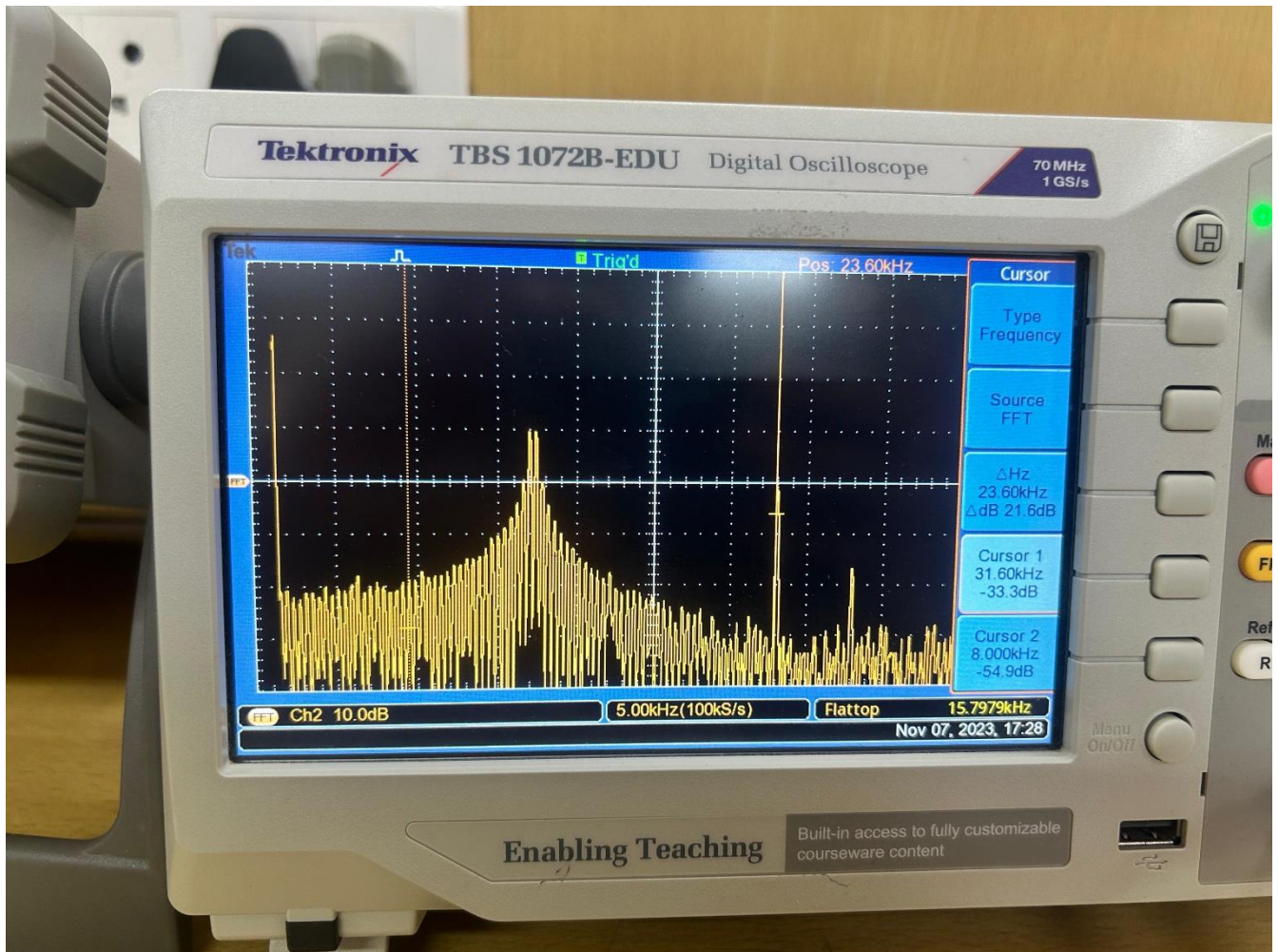


Figure 1.3: FFT of Diode with Center at 32kHz.

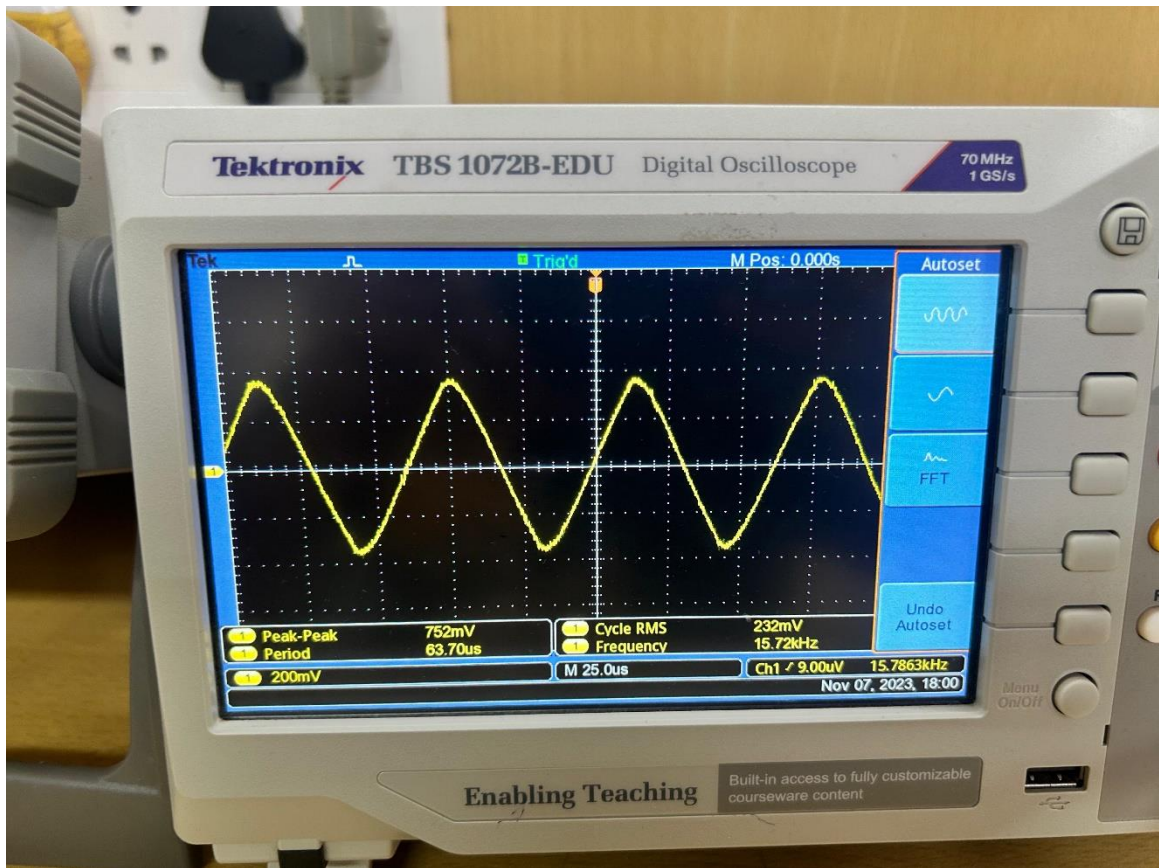


Figure 1.4: BPF Output at Pin 6

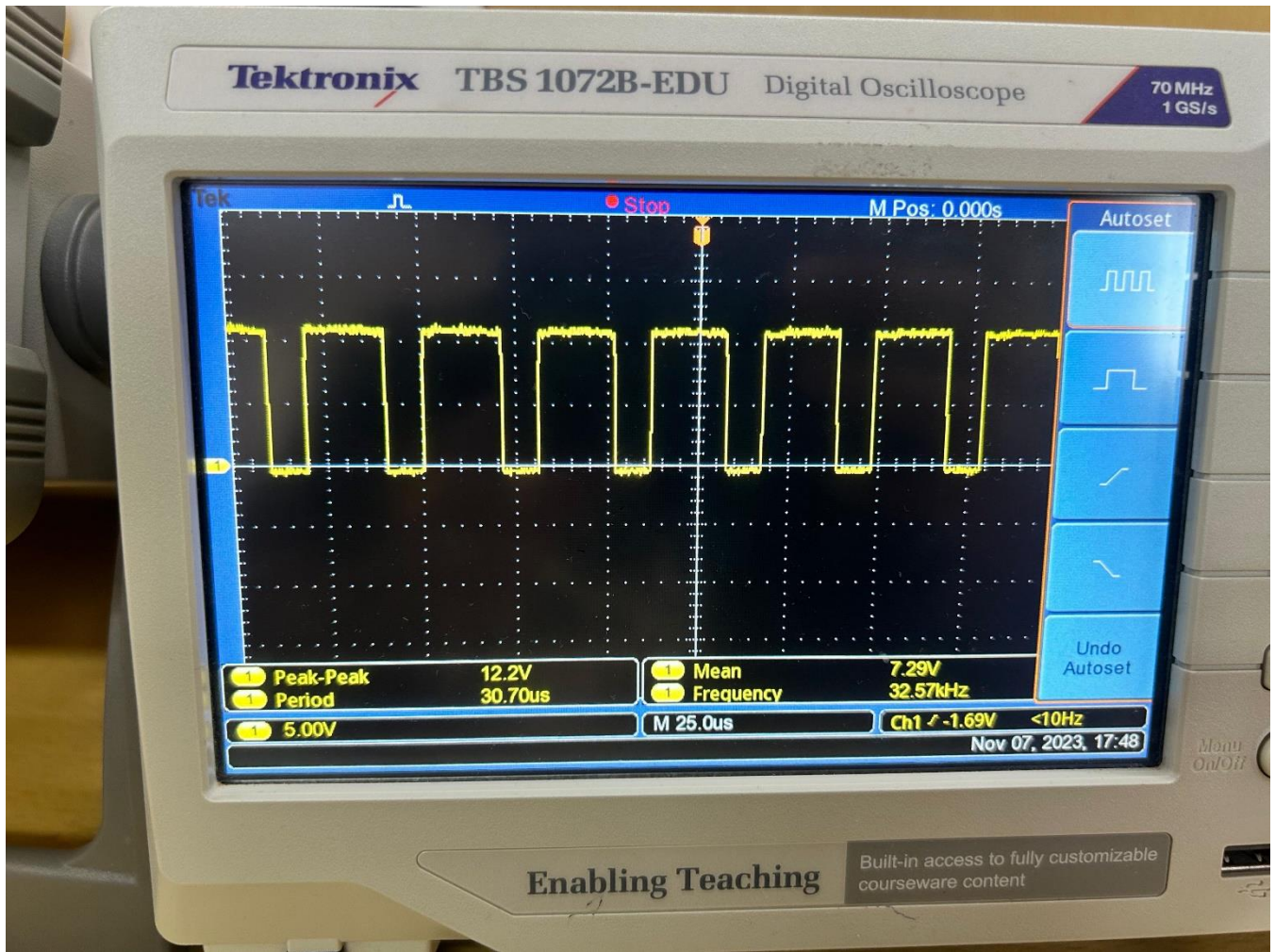


Figure 1.5: PLL Free Running Frequency at 32kHz.

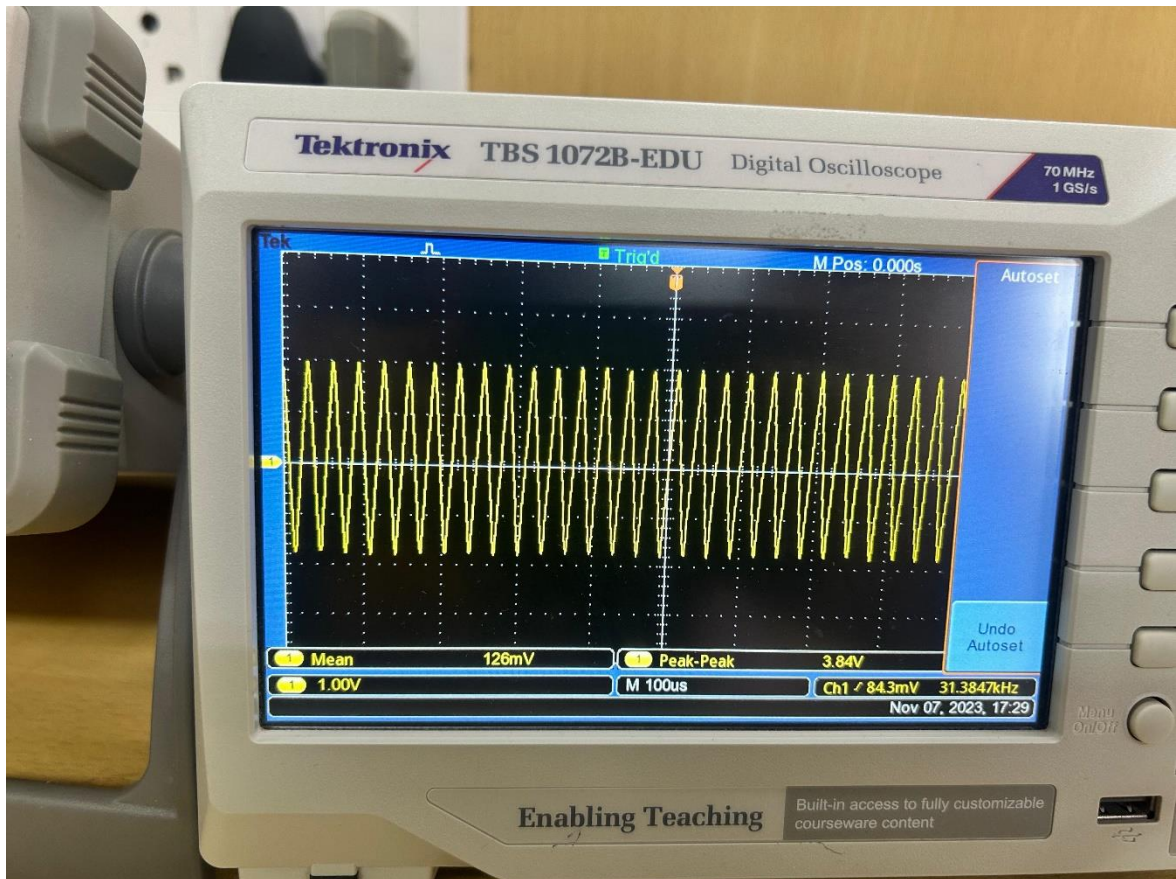


Figure 1.6: PLL output with Input at pin 2

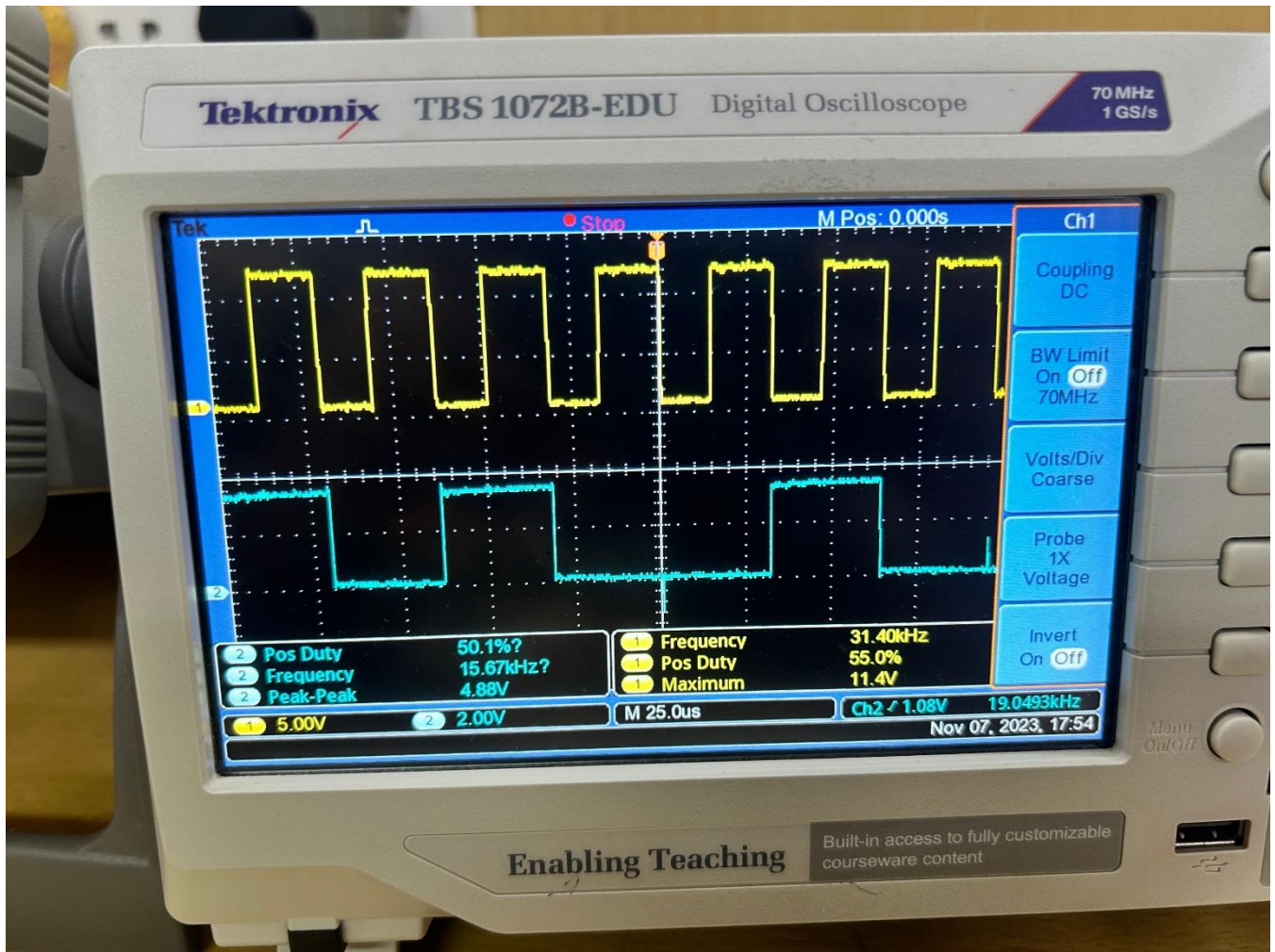


Figure 1.7: Frequency Divider

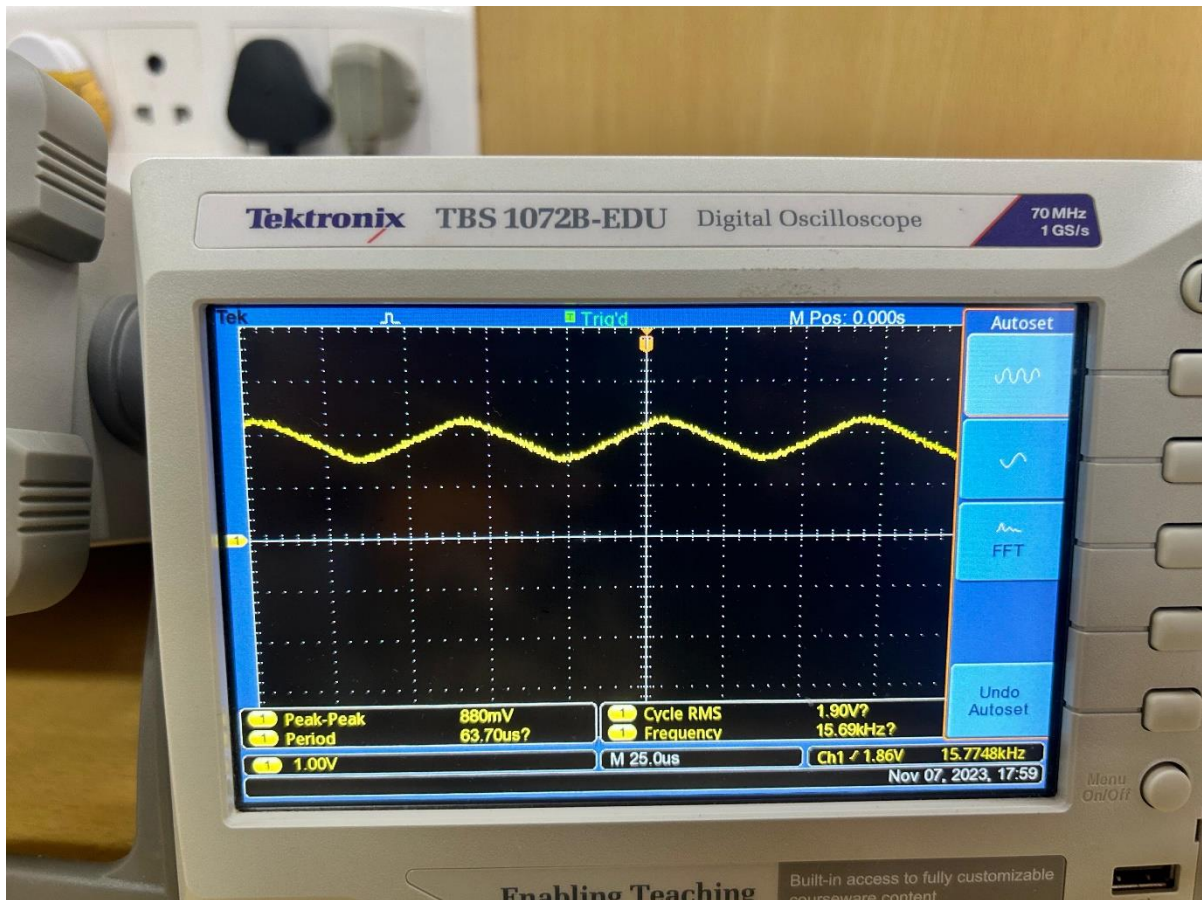


Figure 1.8: Output of 2nd order LPF

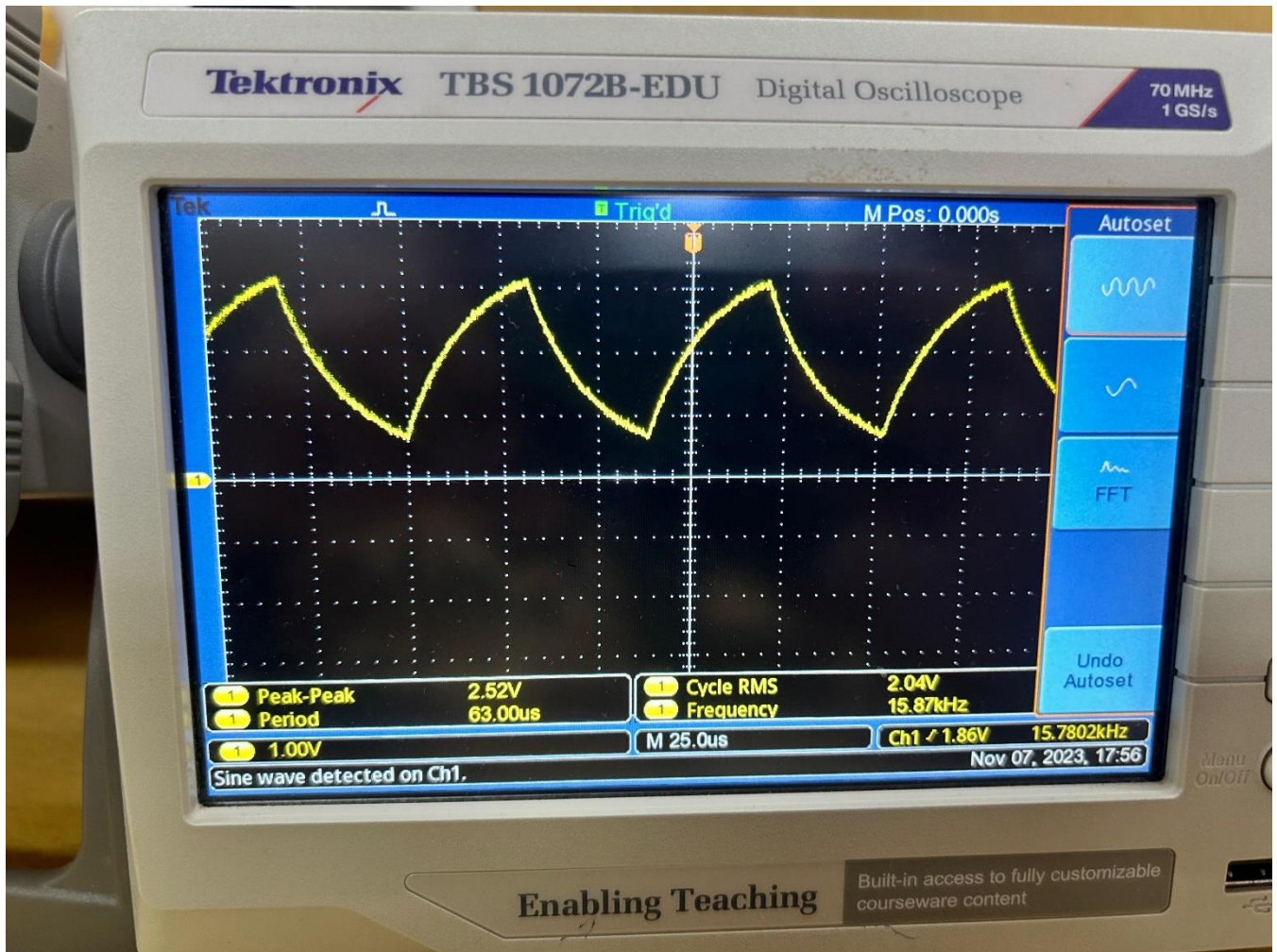


Figure 1.9: Recovered Carrier

1.2 Precautions

1. Check the connections before switching on the kit.
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