# LAMPIRAN A
# CONTOH PERHITUNGAN

## A.1 Perhitungan S21

$S21 = 10^{\log mag/20}$ ..... (A.1)

S21 = 10^(B2/20)

## A.2 Perhitungan Z Comp

Z Comp = 100 x ((1-S21)/S21)) ..... (A.2)

Z Comp =100*((1-D2)/D2)

## A3 Perhitungan Z Imaginer

Z Imaginer = Z Comp x SIN(Radians (Phase)) ..... (A.3)

Z Imaginer =E2*SIN(RADIANS(C2))

## A.4 Perhitungan Kapasitansi

C = 1/(2 x 3,14 x Frekuensi x Z Imaginer) ..... (A.4)

C =1/(2*3.14*A2*F2)

# LAMPIRAN B

# DATA HASIL PENELITIAN

Tabel B.1 Data Osiloskop Udara Tanpa Chamber

| Freq (kHz) | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 |
|---|---|---|---|---|---|---|---|---|---|
| v12 | 4.4 | 4.4 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.4 | 4.8 |
| v13 | 0.8 | 0.8 | 0.4 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| v14 | 4.4 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 |
| v15 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| v16 | 0.4 | 0.4 | 0.4 | 0.4 | 0.8 | 0.4 | 0.8 | 0.4 | 0.4 |
| v17 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0 |
| v18 | 0.4 | 0 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0 |
| v19 | 0.4 | 0 | 0.4 | 0.4 | 0 | 0 | 0 | 0.4 | 0 |
| v23 | 4.4 | 4.4 | 4.4 | 4.4 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 |
| v24 | 0.8 | 0.8 | 0.8 | 0.8 | 1.2 | 0.8 | 0.8 | 0.8 | 0.8 |
| v25 | 3.59 | 3.2 | 3.2 | 3.59 | 3.59 | 4 | 4 | 3.59 | 3.59 |
| v26 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.6 | 1.6 |
| v27 | 0.4 | 0 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0 | 0 |
| v28 | 0.4 | 0 | 0.4 | 0.4 | 0 | 0.4 | 0.4 | 0 | 0 |
| v29 | 0.4 | 0 | 0.4 | 0 | 0 | 0 | 0 | 0 | 0 |
| v34 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0 | 0 | 0 |
| v35 | 0.4 | 0.8 | 0.8 | 0.4 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| v36 | 12.3 | 12.8 | 12.8 | 12.8 | 12.8 | 12.8 | 12.8 | 12.8 | 12.8 |
| v37 | 0 | 0.4 | 0.4 | 0.8 | 0.4 | 0.4 | 0.4 | 0 | 0 |
| v38 | 0 | 0.4 | 0 | 0.4 | 0.4 | 0.4 | 0 | 0 | 0.4 |
| v39 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0 | 0.4 |
| v45 | 3.59 | 3.59 | 4 | 3.59 | 4 | 4 | 4 | 4 | 4 |
| v46 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.8 | 0.4 | 0.4 |
| v47 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| v48 | 0 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| v49 | 0 | 0.4 | 0 | 0.4 | 0.4 | 0.8 | 0.8 | 0.4 | 0.4 |
| v56 | 4.8 | 4.8 | 5.19 | 5.19 | 5.19 | 5.19 | 4.8 | 5.19 | 5.19 |
| v57 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| v58 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| v59 | 6.4 | 6.4 | 6.4 | 6 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 |
| v67 | 0 | 0.4 | 0.4 | 0.4 | 0.4 | 0.8 | 0 | 0.4 | 0.8 |
| v68 | 0.8 | 0.4 | 0.8 | 0.4 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| v69 | 5.59 | 5.59 | 5.59 | 6 | 5.59 | 5.59 | 5.59 | 5.59 | 6 |
| v78 | 5.59 | 5.59 | 5.59 | 6 | 6 | 5.59 | 5.59 | 5.59 | 5.59 |
| v79 | 0 | 0.8 | 0.4 | 0.4 | 0.8 | 0.4 | 0.8 | 0.4 | 0.4 |
| v89 | 4 | 3.59 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |

| Freq (kHz) | 1200 | 1400 | 1600 | 1800 | 2000 | 2200 | 2400 | 2600 | 2800 | 3000 |
|---|---|---|---|---|---|---|---|---|---|---|
| v12 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 |
| v13 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 1.2 |
| v14 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 |
| v15 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| v16 | 0 | 0.4 | 0.4 | 0 | 0.4 | 0 | 0.4 | 0 | 0 | 0.4 |
| v17 | 0 | 0 | 0 | 0 | 0.4 | 0 | 0 | 0 | 0 | 0.4 |
| v18 | 0 | 0 | 0 | 0 | 0.4 | 0 | 0 | 0 | 0 | 0.4 |
| v19 | 0 | 0 | 0 | 0 | 0.4 | 0 | 0 | 0 | 0 | 0.4 |
| v23 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| v24 | 0.8 | 0.8 | 0.8 | 0.8 | 1.2 | 0.8 | 0.8 | 0.8 | 0.8 | 1.2 |
| v25 | 3.59 | 3.59 | 3.59 | 3.59 | 3.59 | 3.59 | 4 | 3.59 | 3.59 | 3.59 |
| v26 | 1.6 | 1.6 | 1.2 | 1.2 | 1.6 | 1.2 | 1.6 | 1.2 | 1.2 | 1.2 |
| v27 | 0 | 0 | 0 | 0 | 0.4 | 0 | 0 | 0 | 0.4 | 0.4 |
| v28 | 0 | 0 | 0 | 0 | 0.4 | 0 | 0 | 0 | 0 | 0.4 |
| v29 | 0 | 0 | 0 | 0 | 0.4 | 0 | 0 | 0 | 0 | 0.4 |
| v34 | 0 | 0 | 0 | 0 | 0.4 | 0 | 0 | 0 | 0.4 | 0.4 |
| v35 | 0.8 | 0.8 | 0.8 | 0.8 | 1.2 | 0.8 | 0.8 | 0.8 | 0.8 | 1.2 |
| v36 | 12.8 | 12.8 | 12.8 | 12.8 | 12.8 | 12.8 | 12.8 | 12.8 | 12.8 | 12.8 |
| v37 | 0 | 0 | 0 | 0 | 0.4 | 0 | 0 | 0 | 0 | 0.4 |
| v38 | 0.4 | 0.4 | 0.4 | 0.4 | 0 | 0.4 | 0.4 | 0 | 0 | 0.4 |
| v39 | 0.4 | 0.4 | 0.4 | 0.4 | 0 | 0.4 | 0.4 | 0.8 | 0.8 | 0.4 |
| v45 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| v46 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v47 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| v48 | 0.8 | 0.8 | 0.8 | 0.8 | 1.2 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| v49 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0 | 0 | 0 | 0.4 |
| v56 | 5.19 | 5.59 | 5.59 | 5.59 | 5.19 | 5.19 | 5.19 | 5.19 | 5.19 | 5.19 |
| v57 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| v58 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| v59 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 |
| v67 | 0 | 0 | 0 | 0 | 0.4 | 0 | 0 | 0 | 0 | 0.4 |
| v68 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| v69 | 6 | 5.59 | 6 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 |
| v78 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 6 |
| v79 | 0 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0 | 0 | 0.4 |
| v89 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |

Tabel B.2 Data Osiloskop Udara Menggunakan Chamber

| Freq (kHz) | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 |
|---|---|---|---|---|---|---|---|---|---|
| v12 | 4.4 | 4.4 | 4.4 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 |
| v13 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| v14 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 |
| v15 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 1.2 | 0.8 |
| v16 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v17 | 0.4 | 0 | 0 | 0 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v18 | 0.4 | 0 | 0 | 0 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v19 | 0.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 |
| v23 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 |
| v24 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 1.2 | 1.2 | 1.2 | 1.2 |
| v25 | 3.59 | 3.59 | 3.59 | 3.59 | 3.59 | 4 | 4 | 3.59 | 3.59 |
| v26 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| v27 | 0 | 0 | 0 | 0 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v28 | 0 | 0 | 0 | 0 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v29 | 0.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 0.4 |
| v34 | 0.4 | 0 | 0 | 0 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v35 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 1.2 | 1.2 |
| v36 | 12.8 | 12.8 | 12.8 | 12.8 | 12.8 | 12.8 | 12.8 | 12.8 | 12.8 |
| v37 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 0.4 | 0.4 |
| v38 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0 | 0 |
| v39 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.8 | 0.8 | 0.8 |
| v45 | 3.59 | 3.59 | 3.59 | 3.59 | 3.59 | 4 | 4 | 4 | 4 |
| v46 | 0.4 | 0 | 0 | 0 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v47 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| v48 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| v49 | 0 | 0 | 0 | 0 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v56 | 5.19 | 5.19 | 5.19 | 5.19 | 5.19 | 5.59 | 5.59 | 5.59 | 5.59 |
| v57 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| v58 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| v59 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 |
| v67 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0 | 0 |
| v68 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| v69 | 6 | 5.59 | 5.59 | 5.59 | 6 | 6 | 6 | 5.59 | 6 |
| v78 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 |
| v79 | 0 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0 | 0 |
| v89 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |

| Freq (kHz) | 1200 | 1400 | 1600 | 1800 | 2000 | 2200 | 2400 | 2600 | 2800 | 3000 |
|---|---|---|---|---|---|---|---|---|---|---|
| v12 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 |
| v13 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| v14 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 |
| v15 | 0.8 | 1.2 | 1.2 | 1.2 | 1.2 | 0.8 | 1.2 | 0.8 | 0.8 | 1.2 |
| v16 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v17 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v18 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v19 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v23 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 |
| v24 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| v25 | 3.59 | 3.59 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| v26 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| v27 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v28 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v29 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v34 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v35 | 1.2 | 1.2 | 1.2 | 0.8 | 0.8 | 1.2 | 0.8 | 0.8 | 0.8 | 0.8 |
| v36 | 12.8 | 12.8 | 12.8 | 12.8 | 12.8 | 12.8 | 12.8 | 12.8 | 12.8 | 12.8 |
| v37 | 0 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 |
| v39 | 0.8 | 0.8 | 0.8 | 0.8 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v45 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| v46 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v47 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| v48 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| v49 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v56 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.19 | 5.19 | 5.19 | 4.8 | 4.8 |
| v57 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| v58 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| v59 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 |
| v67 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| v68 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| v69 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 |
| v78 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 |
| v79 | 0 | 0.4 | 0.4 | 0.4 | 0 | 0 | 0 | 0 | 0 | 0 |
| v89 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |

Tabel B.3 Data Osiloskop Akrilik Tanpa Lapisan

| Freq (kHz) | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 |
|---|---|---|---|---|---|---|---|---|---|
| v12 | 6 | 6 | 6 | 6 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 |
| v13 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| v14 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 |
| v15 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 0.8 | 1.2 | 1.2 |
| v16 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.8 | 0.8 |
| v17 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| v18 | 0 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v19 | 0.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 0 |
| v23 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| v24 | 1.2 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |
| v25 | 5.19 | 5.19 | 5.19 | 5.19 | 5.19 | 5.19 | 5.19 | 5.59 | 5.59 |
| v26 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |
| v27 | 0 | 0 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0 | 0 |
| v28 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v29 | 0 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v34 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v35 | 1.2 | 1.2 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.2 | 1.2 |
| v36 | 14.3 | 14.3 | 14.3 | 14.3 | 14.3 | 14.3 | 14.3 | 14.3 | 14.3 |
| v37 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 0.4 |
| v38 | 0.4 | 0.4 | 0.4 | 0 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v39 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| v45 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 |
| v46 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.8 | 0.8 | 0.8 | 0.8 |
| v47 | 5.59 | 5.59 | 5.59 | 5.19 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 |
| v48 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| v49 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v56 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 |
| v57 | 1.2 | 1.2 | 1.2 | 1.2 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |
| v58 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| v59 | 6.8 | 6.8 | 7.19 | 6.8 | 6.8 | 6.8 | 6.8 | 6.8 | 6.8 |
| v67 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v68 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.6 | 1.6 | 1.6 |
| v69 | 8 | 8 | 8 | 7.59 | 7.59 | 7.59 | 7.59 | 8 | 8 |
| v78 | 6.8 | 7.19 | 7.19 | 7.19 | 6.8 | 7.19 | 7.19 | 7.19 | 7.19 |
| v79 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v89 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 |

| Freq (kHz) | 1200 | 1400 | 1600 | 1800 | 2000 | 2200 | 2400 | 2600 | 2800 | 3000 |
|---|---|---|---|---|---|---|---|---|---|---|
| v12 | 6.4 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| v13 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| v14 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 |
| v15 | 1.2 | 0.8 | 0.8 | 0.8 | 1.2 | 0.8 | 0.8 | 1.2 | 0.8 | 1.2 |
| v16 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v17 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v18 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v19 | 0.4 | 0.4 | 0.4 | 0.4 | 0 | 0 | 0 | 0 | 0.4 | 0 |
| v23 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| v24 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |
| v25 | 5.59 | 5.59 | 5.19 | 5.19 | 5.19 | 5.19 | 5.19 | 5.19 | 4.8 | 4.8 |
| v26 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |
| v27 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| v28 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0 | 0 | 0 | 0.4 | 0.4 |
| v29 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0 | 0 | 0 |
| v34 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v35 | 1.6 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| v36 | 14.3 | 14.3 | 14.3 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| v37 | 0.4 | 0.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| v38 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v39 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| v45 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 |
| v46 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.4 | 0.4 | 0.4 |
| v47 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 |
| v48 | 1.2 | 1.2 | 1.2 | 1.2 | 1.6 | 1.6 | 1.6 | 1.2 | 1.2 | 1.2 |
| v49 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0 | 0 | 0 | 0 |
| v56 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| v57 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |
| v58 | 6 | 6 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 |
| v59 | 6.8 | 6.8 | 6.8 | 6.8 | 6.8 | 6.8 | 6.8 | 6.8 | 6.8 | 6.8 |
| v67 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0 | 0.4 | 0.4 | 0 | 0 |
| v68 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| v69 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7.59 |
| v78 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 |
| v79 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v89 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 |

Tabel B.4 Data Osiloskop Akrilik 1 Lapisan Coating

| Freq (kHz) | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 |
|---|---|---|---|---|---|---|---|---|---|
| v12 | 6 | 6 | 6 | 6 | 6 | 6 | 6.4 | 6.4 | 6.4 |
| v13 | 0.8 | 0.8 | 0.8 | 0.8 | 1.2 | 1.2 | 0.8 | 0.8 | 0.8 |
| v14 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 |
| v15 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| v16 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.8 | 0.4 | 0.4 | 0.4 |
| v17 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0 | 0.4 | 0.4 | 0.4 |
| v18 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0 | 0 | 0.4 |
| v19 | 0 | 0 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v23 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| v24 | 1.2 | 1.2 | 1.2 | 1.2 | 1.6 | 1.6 | 1.2 | 1.6 | 1.6 |
| v25 | 5.19 | 5.19 | 5.19 | 5.19 | 5.19 | 5.19 | 5.19 | 5.19 | 5.19 |
| v26 | 1.2 | 1.6 | 1.2 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |
| v27 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0 | 0 |
| v28 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v29 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v34 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v35 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |
| v36 | 14.3 | 14.3 | 14.3 | 14.3 | 14.3 | 14.3 | 14.3 | 14.3 | 14.3 |
| v37 | 0 | 0.4 | 0.4 | 0.4 | 0.4 | 0 | 0 | 0 | 0 |
| v38 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0 |
| v39 | 0.4 | 0.8 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v45 | 5.59 | 5.19 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 |
| v46 | 0.4 | 0.4 | 0.4 | 0.4 | 0.8 | 0.8 | 0.4 | 0.8 | 0.4 |
| v47 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 |
| v48 | 1.2 | 1.2 | 1.2 | 1.2 | 1.6 | 1.2 | 1.6 | 1.6 | 1.6 |
| v49 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0 | 0 | 0 | 0 |
| v56 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 |
| v57 | 1.2 | 1.2 | 1.2 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |
| v58 | 6.4 | 6.4 | 6.4 | 6.4 | 6 | 6 | 6 | 6 | 6 |
| v59 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 |
| v67 | 0 | 0 | 0 | 0.4 | 0.4 | 0 | 0.4 | 0 | 0 |
| v68 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |
| v69 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| v78 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 |
| v79 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v89 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 |

| Freq (kHz) | 1200 | 1400 | 1600 | 1800 | 2000 | 2200 | 2400 | 2600 | 2800 | 3000 |
|---|---|---|---|---|---|---|---|---|---|---|
| v12 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6 | 6 | 6 |
| v13 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| v14 | 6.4 | 6.4 | 6.4 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| v15 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| v16 | 0.4 | 0.4 | 0.8 | 0.8 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v17 | 0.4 | 0.4 | 0.4 | 0.4 | 0 | 0 | 0 | 0 | 0 | 0 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| v18 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0 | 0 | 0 |
| v19 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v23 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| v24 | 1.6 | 1.2 | 1.6 | 1.2 | 1.6 | 1.6 | 1.6 | 1.2 | 1.2 | 1.6 |
| v25 | 5.19 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 5.19 | 4.8 | 4.8 |
| v26 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |
| v27 | 0.4 | 0 | 0.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| v28 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v29 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v34 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v35 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |
| v36 | 14.3 | 14.3 | 14.3 | 14.3 | 14.3 | 14 | 14 | 14 | 14 | 14 |
| v37 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| v38 | 0.4 | 0 | 0 | 0 | 0 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v39 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.8 | 0.8 | 0.8 | 0.8 |
| v45 | 5.59 | 5.59 | 5.59 | 5.59 | 5.19 | 5.19 | 5.59 | 5.19 | 5.59 | 5.19 |
| v46 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.8 | 0.4 | 0.4 | 0.8 |
| v47 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 |
| v48 | 1.6 | 1.6 | 1.6 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| v49 | 0 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v56 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 |
| v57 | 1.6 | 1.6 | 1.6 | 1.2 | 1.6 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| v58 | 6 | 6 | 6 | 6 | 6 | 5.59 | 6 | 5.59 | 5.59 | 5.59 |
| v59 | 7.19 | 7.19 | 7.19 | 6.8 | 6.8 | 6.8 | 6.8 | 6.8 | 6.8 | 6.8 |
| v67 | 0.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 0.4 | 0 |
| v68 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| v69 | 8 | 8 | 8 | 8 | 7.59 | 7.59 | 7.59 | 7.59 | 7.59 | 7.59 |
| v78 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 |
| v79 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v89 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 |

Tabel B.5 Data Osiloskop Akrilik 3 Lapisan Coating

| Freq (kHz) | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 |
|---|---|---|---|---|---|---|---|---|---|
| v12 | 6.4 | 6.4 | 6.4 | 6.4 | 6 | 6.4 | 6 | 6 | 6 |
| v13 | 0.8 | 0.8 | 0.8 | 0.8 | 1.2 | 1.2 | 0.8 | 0.8 | 0.8 |
| v14 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 |
| v15 | 0.8 | 1.2 | 1.2 | 1.2 | 1.2 | 1.6 | 1.6 | 1.2 | 1.2 |
| v16 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v17 | 0.4 | 0 | 0 | 0 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v18 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v19 | 0 | 0 | 0 | 0 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v23 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| v24 | 1.2 | 1.2 | 1.2 | 1.6 | 1.6 | 1.6 | 1.6 | 1.2 | 1.6 |
| v25 | 5.19 | 5.19 | 5.19 | 5.19 | 5.19 | 5.19 | 5.19 | 5.19 | 5.19 |
| v26 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |
| v27 | 0 | 0 | 0 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v28 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v29 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v34 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v35 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |
| v36 | 14.3 | 14.3 | 14.3 | 14.3 | 14.3 | 14.3 | 14.3 | 14.3 | 14.3 |
| v37 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.4 | 0 |
| v38 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v39 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| v45 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 |
| v46 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v47 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 |
| v48 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.6 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| v49 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0 |
| v56 | 7.59 | 7.59 | 7.59 | 7.59 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 |
| v57 | 1.2 | 1.2 | 1.2 | 1.2 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |
| v58 | 6.4 | 6 | 6 | 6 | 6.4 | 6 | 6 | 6 | 6 |
| v59 | 7.19 | 7.19 | 7.19 | 7.19 | 6.8 | 6.8 | 6.8 | 7.19 | 6.8 |
| v67 | 0 | 0 | 0 | 0.4 | 0.4 | 0 | 0 | 0 | 0 |
| v68 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |
| v69 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| v78 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 |
| v79 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v89 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 |

| Freq (kHz) | 1200 | 1400 | 1600 | 1800 | 2000 | 2200 | 2400 | 2600 | 2800 | 3000 |
|---|---|---|---|---|---|---|---|---|---|---|
| v12 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| v13 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| v14 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 |
| v15 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 0.8 | 0.8 | 0.8 |
| v16 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v17 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v18 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v19 | 0.4 | 0.4 | 0 | 0 | 0 | 0.4 | 0 | 0 | 0 | 0 |
| v23 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| v24 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.6 | 1.6 |
| v25 | 5.19 | 5.19 | 5.19 | 5.19 | 5.19 | 5.19 | 5.19 | 5.19 | 5.19 | 5.19 |
| v26 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |
| v27 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0 | 0 | 0 | 0 | 0 |
| v28 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v29 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v34 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v35 | 1.6 | 1.6 | 1.6 | 1.6 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| v36 | 14.3 | 14.3 | 14.3 | 14.3 | 14.3 | 14.3 | 14.3 | 14.3 | 14.3 | 14 |
| v37 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| v38 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v39 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| v45 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.19 | 5.19 | 5.59 | 5.59 |
| v46 | 0.8 | 0.4 | 0.8 | 0.4 | 0.4 | 0.4 | 0.8 | 0.4 | 0.4 | 0.4 |
| v47 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 |
| v48 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.2 | 1.2 | 1.2 |
| v49 | 0 | 0 | 0.4 | 0.4 | 0.4 | 0.4 | 0 | 0 | 0 | 0 |
| v56 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 |
| v57 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |
| v58 | 6 | 6 | 6 | 6 | 5.59 | 5.59 | 6 | 5.59 | 6 | 5.59 |
| v59 | 6.8 | 6.8 | 7.19 | 6.8 | 6.8 | 6.8 | 6.8 | 7.19 | 6.8 | 6.8 |
| v67 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0 | 0 | 0.4 | 0.4 | 0.4 |
| v68 | 1.6 | 1.6 | 1.6 | 1.6 | 1.2 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |
| v69 | 8 | 8 | 8 | 8 | 8 | 8 | 7.59 | 8 | 7.59 | 7.59 |
| v78 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 | 7.19 |
| v79 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| v89 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 | 5.59 |

Catatan : Nilai tegangan terukur pada data osiloskop dengan satuan (mV)

*Script* Colab untuk pengukuran sensor menggunakan alat *Vector Network Analyzer* (VNA):

Import library yang diperlukan

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
```

Load data dari excel. Hapus kolom pertama

```
df_uda = pd.read_excel('udara_c_par.xlsx')
df_uda.drop("Frequency",axis=1, inplace=True)

df_ak = pd.read_excel('akrilik1_c_par.xlsx')
df_ak.drop("Frequency",axis=1, inplace=True)

df_c1 = pd.read_excel('cat1_c_par.xlsx')
df_c1.drop("Frequency",axis=1, inplace=True)

df_c3 = pd.read_excel('cat3_c_par.xlsx')
df_c3.drop("Frequency",axis=1, inplace=True)
```

Frekuensi dan Indeks

```
frequency = df_uda.columns
freq = np.array(df_uda.columns.astype(float))
```

Plot Data. Sumbu-x Indeks pasangan elektroda, Sumbu-y adalah nilai pengukuran

```
f = 15

fig, ax1 = plt.subplots()

ax1.plot(df_uda.iloc[:,f], alpha =0.5)
ax1.plot(df_ak.iloc[:,f], alpha =0.5)
ax1.plot(df_c1.iloc[:,f], alpha =0.5)
ax1.plot(df_c3.iloc[:,f], alpha =0.5)

ax1.legend(['Udara', 't = 2,302 mm', 't = 2,486 mm', 't = 2,55
7 mm'])
ax1.set_title('Karakteristik sinyal pada f=' +str(frequency[f]
)+ 'Hz')
ax1.set_xlabel('Index pasangan elektroda')
ax1.set_ylabel('Kapasitansi (F)')
```

Plot Data. Sumbu-x adalah seluruh kolom (frekuensi), Sumbu-y adalah baris ke-p (indeks pasangan pengukuran)

```
fig, ax1 = plt.subplots()
p=0

ax1.plot(freq, df_uda.iloc[p,:], alpha =0.5)
ax1.plot(freq, df_ak.iloc[p,:], alpha =0.5)
ax1.plot(freq, df_c1.iloc[p,:], alpha =0.5)
ax1.plot(freq, df_c3.iloc[p,:], alpha =0.5)

#ax1.set_ylim([-1e-6,2.3e-5])
ax1.legend(['Udara', 't = 2,302 mm', 't = 2,486 mm', 't = 2,55
7 mm'])
ax1.set_xscale('log')
ax1.set_title('Karakteristik sinyal elektroda 1-2')
ax1.set_xlabel('Frekuensi (Hz)')
ax1.set_ylabel('Kapasitansi (F)')


fig, ax1 = plt.subplots()
p=1

ax1.plot(freq, df_uda.iloc[p,:], alpha =0.5)
ax1.plot(freq, df_ak.iloc[p,:], alpha =0.5)
ax1.plot(freq, df_c1.iloc[p,:], alpha =0.5)
ax1.plot(freq, df_c3.iloc[p,:], alpha =0.5)

#ax1.set_ylim([-1e-6,2.3e-5])
ax1.legend(['Udara', 't = 2,302 mm', 't = 2,486 mm', 't = 2,55
7 mm'])
ax1.set_xscale('log')
ax1.set_title('Karakteristik sinyal elektroda 1-3')
ax1.set_xlabel('Frekuensi (Hz)')
ax1.set_ylabel('Kapasitansi (F)')
```

Delta, rentang nilai (absolut) antara data c3 dan data ak

```
ak =  np.array(df_ak)
c3 = np.array(df_c3)
delta = np.abs(ak - c3)
```

Plot Delta.Sumbu-x adalah seluruh kolom (frekuensi), Sumbu-y adalah nilai delta pada baris ke-n (indeks pasangan pengukuran)

```
fig, ax1 = plt.subplots()
```

```
ax1.plot(freq, delta[0,:], c='b', alpha=0.5)
ax1.plot(freq, delta[1,:], c='r', alpha=0.5)


# ax1.set_ylim([-1e-6,2.3e-5])
ax1.legend(['Elektroda 1-2', 'Elektroda 1-3'])
ax1.set_xscale('log')
ax1.set_title('Delta akrilik1 dan cat3')
ax1.set_xlabel('Frekuensi (Hz)')
ax1.set_ylabel('Kapasitansi (F)')
```

Cek nilai frekuensi pada kolom tertentu

```
display(df_ak.columns[15])
display(df_ak.columns[28])
```

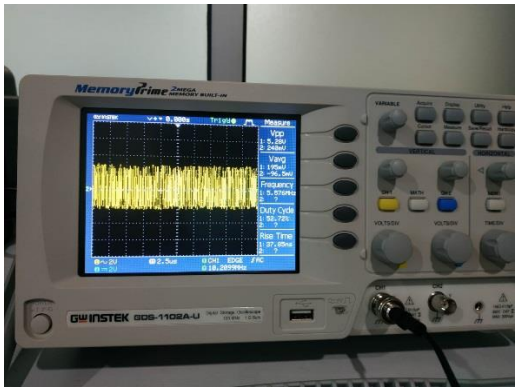
Plot hubungan nilai sensor terhadap ketebalan objek. Nilai sensor dengan objek ak, c1 dan c3; dibandingkan dengan ketebalan ak, c1 dan c3

```
#Pada frekuensi ~381 kHz
fre = 15
data_mean = [np.array(df_ak).mean(axis=0)[fre], np.array(df_c1
).mean(axis=0)[fre], np.array(df_c3).mean(axis=0)[fre]]
data_tebal = [2.302, 2.486, 2.557]
fig, ax1 = plt.subplots()
ax1.plot(data_tebal,data_mean, 'b-s')
ax1.set_xlabel('Tebal (mm)')
ax1.set_ylabel('Kapasitansi (F)')
ax1.set_title('Pada Frekuensi '+str(frequency[fre])+'Hz')


#Pada frekuensi ~451 kHz
fre = 28
data_mean = [np.array(df_ak).mean(axis=0)[fre], np.array(df_c1
).mean(axis=0)[fre], np.array(df_c3).mean(axis=0)[fre]]
data_tebal = [2.302, 2.486, 2.557]
fig, ax1 = plt.subplots()
ax1.plot(data_tebal,data_mean, 'b-s')
ax1.set_xlabel('Tebal (mm)')
ax1.set_ylabel('Kapasitansi (F)')
ax1.set_title('Pada Frekuensi '+str(frequency[fre])+'Hz')
```

# LAMPIRAN C

# GAMBAR ALAT DAN BAHAN




Gambar C.1 Osiloskop

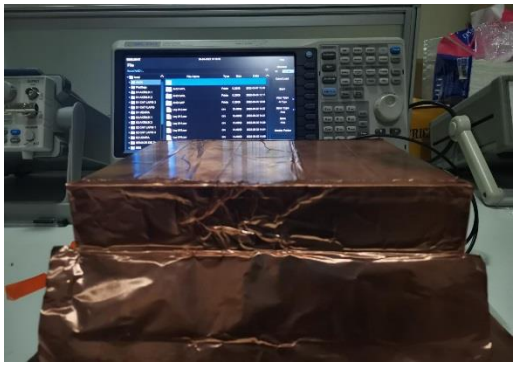

Gambar C.2 Generator Fungsi


Gambar C.3 *Vector Network Analyzer*


Gambar C.4 Kit Kalibrasi

Gambar C.5 Sensor ECVT 9 *Channel*

Gambar C.6 Kabel Konektor



Gambar C.7 Chamber

Gambar C.8 Akrilik


Gambar C.9 Cat

Gambar C.10 Probe Kalibrasi