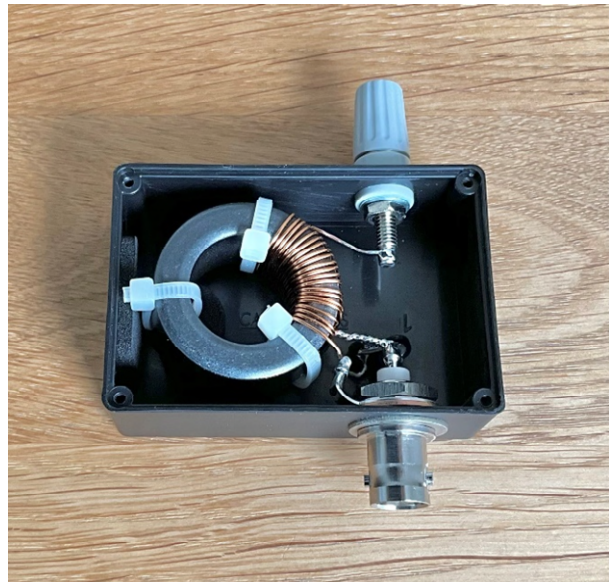# 1:49 EFHW Transformer (50/30 W)



An efficient, small and lightweight EFHW transformer, suitable for the increased load capacity requirements in Data modes, without or with a small linear PA (up to approx. 30 watts) or up to approx. 50 watts in CW/SSB.

## Specifications

| | |
|---|---|
| **Core Material** | Fair-Rite 2643804502 #43 ferrite<br>Ø 31.1/19.05x16.3 mm, 36 g |
| **Winding Type and Material** | AutoTransformer nominal 1:49 (50:2450 ohms), 21 turns, tapped at 3 turns, 0.63 mm ECW |
| **Compensation** | 100 pF/500 V Mica |
| **Power Rating** | 50 watts CW/SSB, 30 watts Data modes |
| **Usable Frequency** | 3.5-30 MHz *(see note on the table below)* |
| **Insertion Loss** | 0.5-0.8 dB at 3.5-24.9 MHz<br>1.2 dB at 28 MHz *(see note on the table below)* |
| **Mismatch Loss** *(power reflected at the input)* | *See Table "Calculations based on VNA measurements" (below)* |
| **Insertion Loss** *(Loss+input Mismatch Loss)* | |
| **Loss** *(power dissipated in core and windings)* | |
| **Efficiency** *(Power out/Power in)* | |
| **Connectors** | Amphenol BNC Jack 50 ohm<br>Ritel Industrial Terminal 4 mm (Ø 10 mm) |
| **Enclosure Type and Dimensions** | Camdenboss RX2009/S, ABS, 64x44x25 mm |
| **EFHW Coupler weight** (fully assembled) | 76 g |
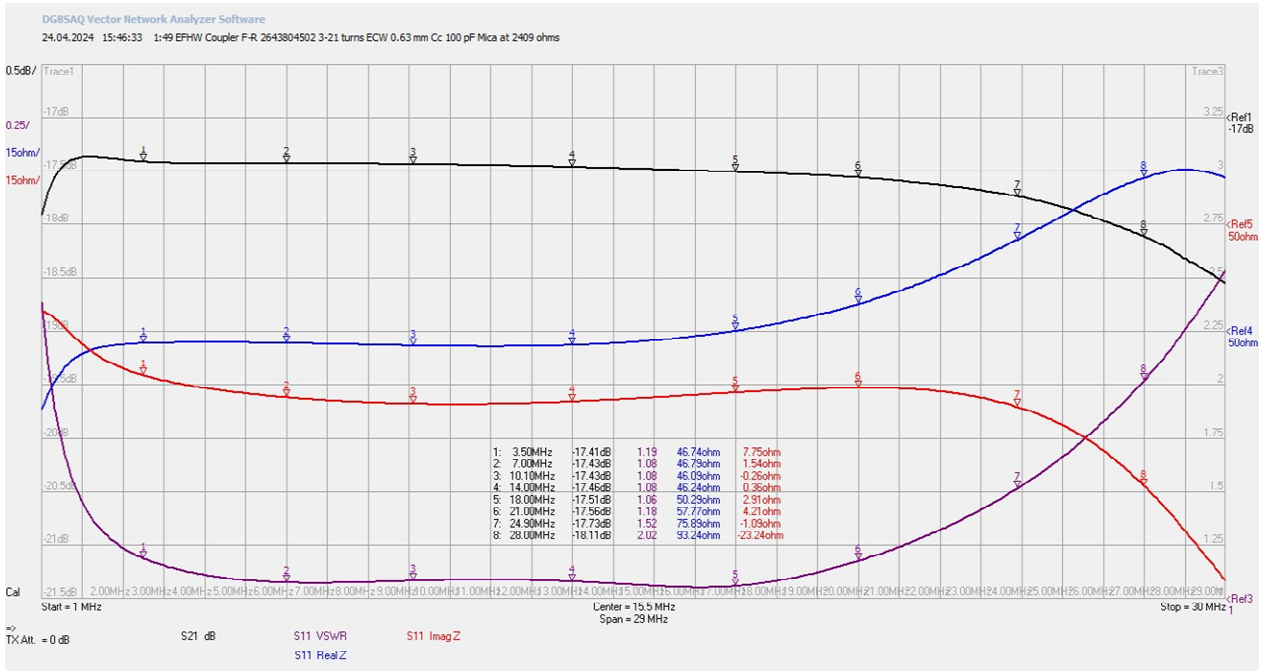
Above are the VNA measurement results, taken on a fully assembled EFHW coupler.

| Calculations based on the VNA measurements above | |
|---|---|
| Load resistor | 2409 ohms carbon |
| Mismatch loss | -10 Log(1-r²) [dB] |
| Load attenuation | -10 Log(50/(50+2409))=16.92 dB |
| Insertion loss | -\|S21\|-Load attenuation [dB] |
| Loss (relevant for core heating) | Insertion loss-Mismatch loss [dB] |

| Frequency [MHz] | Mismatch loss [dB, %] | Insertion loss [dB] | Loss (dissipated power) [dB, %] | Efficiency [%] |
|---|---|---|---|---|
| 3.5 | 0.033, 0.76 | 0.49 | 0.46, 10.05 | 89.33 |
| 7.0 | 0.006, 0.14 | 0.51 | 0.50, 10.87 | 88.92 |
| 10.1 | 0.007, 0.16 | 0.51 | 0.50, 10.87 | 88.92 |
| 14.0 | 0.007, 0.16 | 0.54 | 0.53, 11.49 | 88.31 |
| 18.0 | 0.004, 0.09 | 0.59 | 0.59, 12.70 | 87.30 |
| 21.0 | 0.029, 0.67 | 0.64 | 0.61, 13.10 | 86.30 |
| 24.9 | 0.188, 4.24 | 0.81 | 0.62, 13.30 | 83.00 |
| 28.0 | 0.528, 11.45 *) | 1.19 | 0.66, 14.10 | 76.03 |

*) This value (reflected power at the input due to SWR>2) is significantly higher than the design target of <0.2 dB (approx. 5 %) and is the main reason for the high insertion loss.

It's not a problem for the EFHW coupler itself at the nominal power of 50/30 watts, but this power is then missing at the coupler output … (lower efficiency).