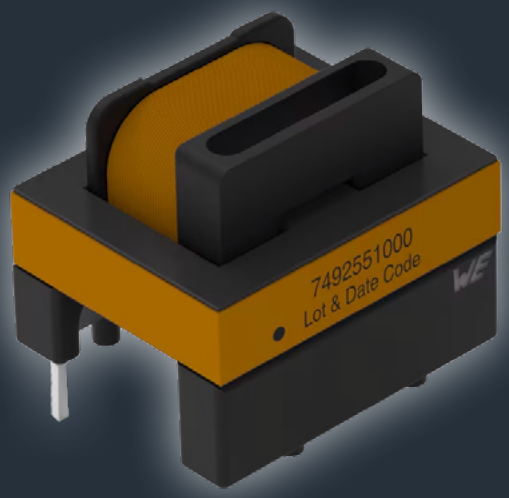
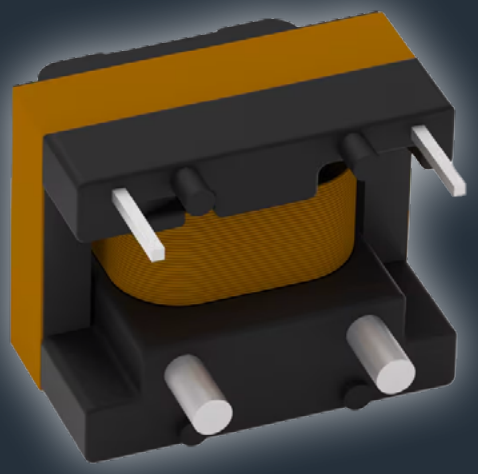
WE-CSTLF

LOW FREQUENCY CURRENT SENSE TRANSFORMER





WÜRTH ELEKTRONIK MORE THAN YOU EXPECT

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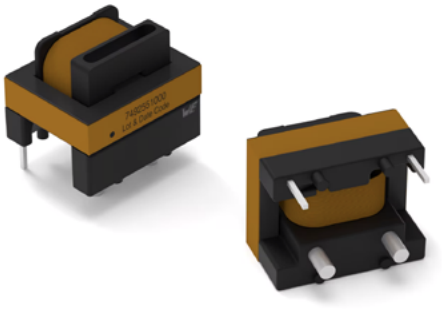


Characteristics

- +45Arms current sensing for high current applications
- Operating frequency 47-400Hz for most power grid applications
- 4kV AC robust dielectric rating for high reliability
- Low profile, compact, EI187 THT
- Operating temp:-40°C to +125°C
- Class F 155°C Insulation System
- AEC-Q200 Grade 1 qualified

Applications

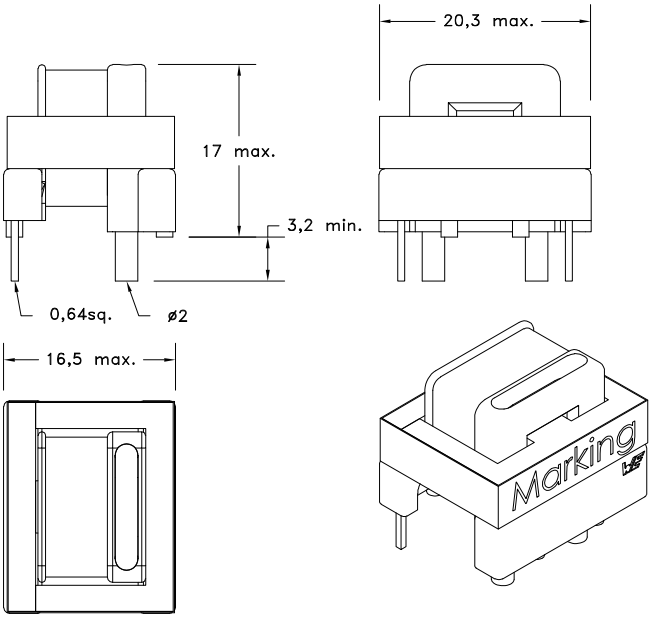
- Motor controls
- EV charging stations
- Overload sensing
- Load drop/shutdown detection
- Line metering
- Load measurements
- AC current detection
- Industrial automation

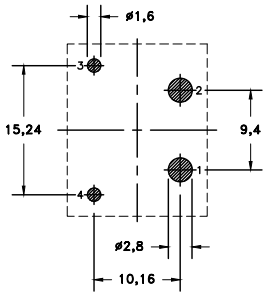
Part Number	Turns Ratio 1:N (PRI:SEC)	L_{SEC} Min (mH)	DCR PRI Max (mΩ)	DCR SEC ±10% (Ω)	Volt-Time Product SEC (VμSec)*	Rated Current Typical (A)
7492550500	500	400	0.27	16.2	30'000	45
7492551000	1000	1600	0.27	78.7	60'000	45
7492551500	1500	3600	0.27	178	90'000	45
7492552000	2000	6400	0.27	317	120'000	45
7492552500	2500	10000	0.27	468	150'000	45
7492553000	3000	14400	0.27	747	180'000	45

*Based on bipolar waveform

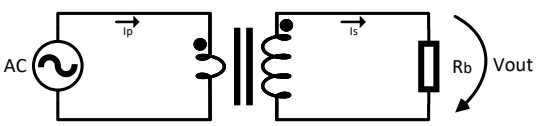
Through Hole - THT

Dimensions and Land Pattern (mm)





Typical Circuit



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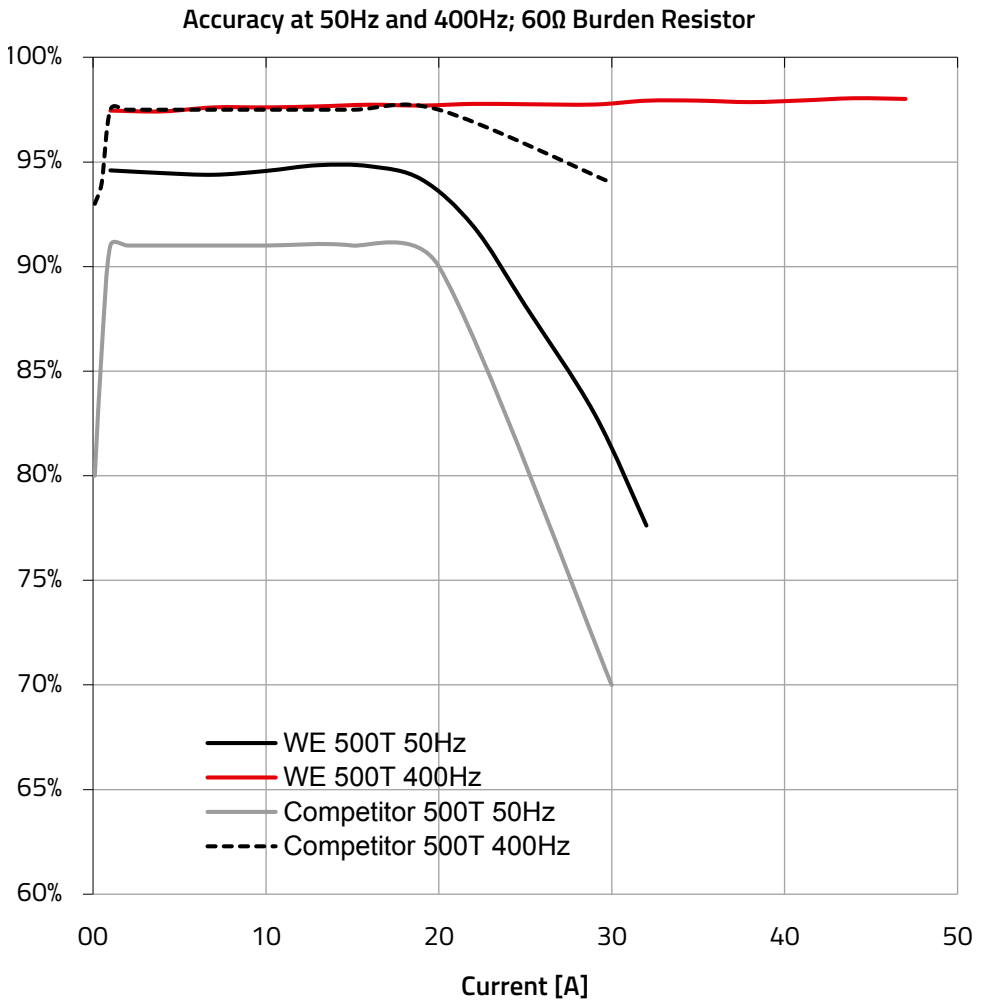
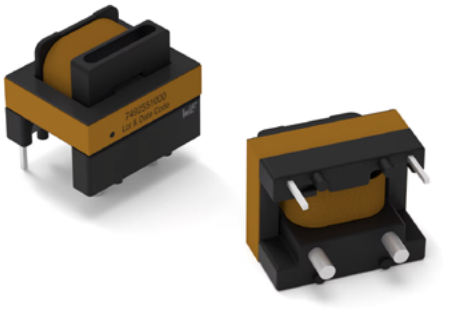
WE-CSTLF Accuracy Comparison



Test Setup

Würth Elektronik 7492550500, 1:500 turns ratio transformer was tested

- Primary winding connected to AC Power Supply
- 60Ω burden resistor connected across secondary
- Input current is swept across desired current range
- Burden voltage is measured at each current step
- Accuracy is determined by comparing the measured burden voltage to the expected burden voltage
- Competitor, 1:500 turns ratio transformer results obtained from competitor datasheet curves



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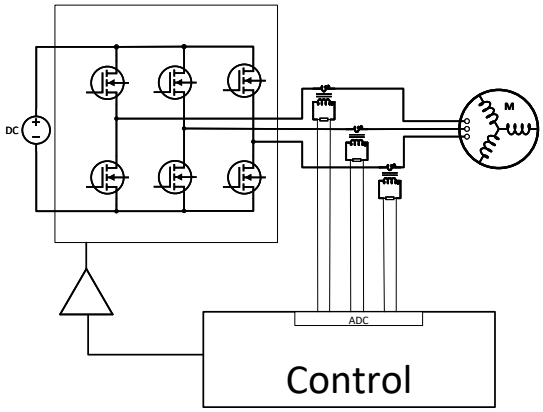
WE-CSTLF Burden Resistor Calculation Example

The following example illustrates the process of selecting a burden resistor value for a line frequency motor drive application. The maximum primary current between the inverter and motor is 33A. The ADC controller is rated for a maximum voltage of 3.3V. The transformer chosen for this application is the 7492551000.



The general transformer relationship equation can be used to determine the secondary current:

$$\frac{I_s}{I_p} = \frac{N_p}{N_s} \rightarrow I_s = \frac{N_p \times I_p}{N_s} \quad (1)$$

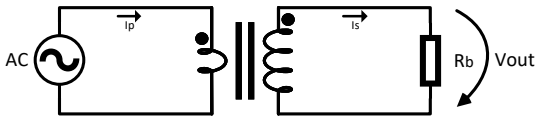
Using Ohm's Law:

$$V = I \times R \rightarrow I = \frac{V}{R} \quad (2)$$

Substituting the secondary current from (1) with (2), the burden resistor value can be determined:

$$\frac{V_b}{R_b} = \frac{N_p \times I_p}{N_s} \rightarrow R_b = \frac{V_b \times N_s}{N_p \times I_p} \quad (3)$$

The desired burden resistor value can be calculated by entering the application specific values:



$$R_b = \frac{3.3V \times 1000}{1 \times 33A} = 100\Omega$$

After reviewing the Würth Elektronik standard resistor catalog, part number 560112132023, 100Ω ±1%, was selected. Lastly using the general power equation and (2):

$$P = I \times V \rightarrow P = \frac{V}{R} \times V \rightarrow P = \frac{V^2}{R} \quad (4)$$

Verify the 250mW power rating of the selected resistor 560112132023 is not exceeded:

$$P_b = \frac{3.3V^2}{100\Omega} = 108.9mW \rightarrow 109mW \leq 250mW$$

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