Below are the commonly used formulas used in testing transformers.

1. Calculating transformer temperature rise.

To calculate the temperature rise of a power transformer use the following formula. The transformer should be left at full load for at least 4 hours to reach and stabilise at its maximum temperature.

$$\Delta t = \frac{R2 - R1}{R1} \quad (K + t1) - (t2 - t1)$$

K	= 234.5° for copper and 225° for aluminium
Δt	= Temperature Rise
R1	= Primary resistance before test. i.e. cold
R2	= Primary resistance after test. i.e. hot
t1	= Ambient temperature before test.
t2	= Ambient temperature after test.

2. Calculating Transformer Voltage Regulation

All transformers have a different output voltage from NO LOAD to FULL LOAD. The % difference between the two levels is known as the regulation and is calculated as follows.

$$\frac{NL - FL}{NL} \times \frac{100}{1}$$

NL : No load voltage **FL** : Full load voltage

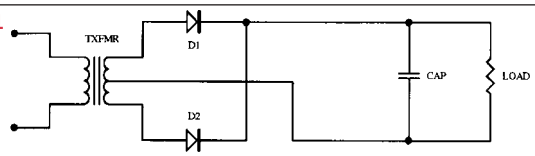
Transformer Insulation Temperature Class

Winding type	Temp Rise (Max)
Class 105(A)	75
Class 120(E)	90
Class 130(B)	95
Class 155(F)	115
Class 180(H)	140
Class 200	160
Class 220	180
Class 250	210

POWER SUPPLY TECHNICAL DATA

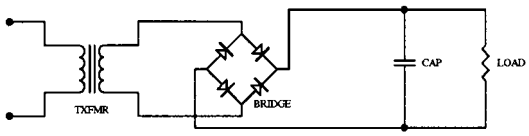
A transformer's VA rating is calculated by multiplying the secondary AC voltage and the secondary AC current. For example, a 24V, 2A transformer would have a 48VA rating. Fig. 1 shows a full wave, centre tap, capacitor filtered, power rectifier arrangement, allowing more current at a lower voltage (for the same VA rating) than the standard full wave bridge arrangement shown in fig. 2. Fig. 3 shows a half wave rectifier with a capacitor filter.

Fig.1



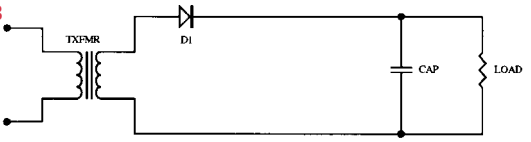
$V_{DC} = 0.71 \times V_{AC}$, $A_{DC} = A_{AC}$

Fig.2



$V_{DC} = 1.41 \times V_{AC}$, $A_{DC} = 0.62 \times A_{AC}$

Fig.3



$V_{DC} = 1.41 \times V_{AC}$, $A_{DC} = 0.28 \times A_{AC}$

V_{AC} = Transformer secondary voltage
V_{DC} = Supply output voltage
A_{AC} = Transformer max secondary current
A_{DC} = Maximum supply output current

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