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Single Phase Uncontrolled Rectifiers Formulas

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List of 19 Single Phase Uncontrolled Rectifiers Formulas

Single Phase Uncontrolled Rectifiers ↗

Full Wave ↗

1) Average Output Current of Single Phase Full Wave Midpoint Diode Rectifier with R Load ↗

$$\text{fx } I_{avg(f)} = \frac{2 \cdot V_{(max)}}{\pi \cdot r}$$

[Open Calculator ↗](#)

$$\text{ex } 2.384627\text{A} = \frac{2 \cdot 221\text{V}}{\pi \cdot 59\Omega}$$

2) Average Output Voltage of Single Phase Full Wave Midpoint Diode Rectifier with R Load ↗

$$\text{fx } V_{dc(f)} = \frac{2 \cdot V_{(max)}}{\pi}$$

[Open Calculator ↗](#)

$$\text{ex } 140.693\text{V} = \frac{2 \cdot 221\text{V}}{\pi}$$

3) Output Average Power of Single Phase Full Wave Midpoint Diode Rectifier with R Load ↗

$$\text{fx } P_{(avg)} = \left(\frac{2}{\pi}\right)^2 \cdot V_{(max)} \cdot I_{max}$$

[Open Calculator ↗](#)

$$\text{ex } 434.4044\text{W} = \left(\frac{2}{\pi}\right)^2 \cdot 221\text{V} \cdot 4.85\text{A}$$

4) Ripple Voltage of Single Phase Full Wave Midpoint Diode Rectifier with R Load ↗

$$\text{fx } V_{r(f)} = 0.3077 \cdot V_{(max)}$$

[Open Calculator ↗](#)

$$\text{ex } 68.0017\text{V} = 0.3077 \cdot 221\text{V}$$

5) RMS Output Current of Single Phase Full Wave Midpoint Diode Rectifier with R Load ↗

$$\text{fx } I_{out(rms)} = \frac{V_s}{r}$$

[Open Calculator ↗](#)

$$\text{ex } 7.457627\text{A} = \frac{440\text{V}}{59\Omega}$$




6) RMS Output Voltage of Single Phase Full Wave Midpoint Diode Rectifier with R Load 

$$\text{fx } V_{\text{rms}(f)} = \frac{V_{(\text{max})}}{\sqrt{2}}$$

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235_img.jpg\)](#)

$$\text{ex } 156.2706\text{V} = \frac{221\text{V}}{\sqrt{2}}$$

Half Wave 7) Average Load Current of Single Phase Half Wave Diode Rectifier with Inductive Load 

$$\text{fx } I_L = \frac{V_{(\text{max})}}{\omega \cdot L}$$

[Open Calculator !\[\]\(5361750c22c4e047a52f4eac1ec2d4cc_img.jpg\)](#)

$$\text{ex } 2.425001\text{A} = \frac{221\text{V}}{30\text{rad/s} \cdot 3.0378\text{H}}$$

8) Average Load Current of Single Phase Half Wave Diode Rectifier with Resistive Load 

$$\text{fx } I_L = \frac{V_{(\text{max})}}{\pi \cdot r}$$

[Open Calculator !\[\]\(b792654f2cef9719eabeb6c5be00811e_img.jpg\)](#)

$$\text{ex } 1.192313\text{A} = \frac{221\text{V}}{\pi \cdot 59\Omega}$$

9) Average Output Current of Single Phase Half Wave Diode Rectifier with Resistive and Inductive Load 

$$\text{fx } I_{\text{avg}(h)} = \frac{\frac{V_{(\text{max})}}{2 \cdot \pi \cdot r}}{1 - \cos(\beta_{\text{diode}})}$$

[Open Calculator !\[\]\(84f47badaad7772cd95667a7c387a639_img.jpg\)](#)

$$\text{ex } 0.305344\text{A} = \frac{\frac{221\text{V}}{2 \cdot \pi \cdot 59\Omega}}{1 - \cos(60\text{rad})}$$


10) Average Output Current of Single Phase Half Wave Diode Rectifier with RL Load and Freewheeling Diode 

$$\text{fx } I_{\text{avg}(h)} = \frac{V_{(\text{max})}}{\pi \cdot r}$$

[Open Calculator !\[\]\(c15650232aa6660c9deb34f3b82dcb72_img.jpg\)](#)

$$\text{ex } 1.192313\text{A} = \frac{221\text{V}}{\pi \cdot 59\Omega}$$




11) Average Output Voltage of Single Phase Half Wave Diode Rectifier with Resistive Load 

$$\text{fx } V_{\text{dc(h)}} = \frac{V_{(\text{max})}}{\pi}$$

[Open Calculator !\[\]\(e78f798d4ea5c530c9db49e7d26e6b95_img.jpg\)](#)


$$\text{ex } 70.34648\text{V} = \frac{221\text{V}}{\pi}$$

12) Average Output Voltage of Single Phase Half Wave Diode Rectifier with RL Load 

$$\text{fx } V_{\text{dc(h)}} = \left(\frac{V_{(\text{max})}}{2 \cdot \pi} \right) \cdot (1 - \cos(\beta_{\text{diode}}))$$

[Open Calculator !\[\]\(05be7c7a8995decd503647c99211f7c2_img.jpg\)](#)


$$\text{ex } 68.6727\text{V} = \left(\frac{221\text{V}}{2 \cdot \pi} \right) \cdot (1 - \cos(60\text{rad}))$$

13) Average Output Voltage of Single Phase Half Wave Diode Rectifier with RL Load and Freewheeling Diode 

$$\text{fx } V_{\text{dc(h)}} = \frac{V_{(\text{max})}}{\pi}$$

[Open Calculator !\[\]\(fe3aebe81acea8d45108cd2768939da7_img.jpg\)](#)

$$\text{ex } 70.34648\text{V} = \frac{221\text{V}}{\pi}$$

14) Output DC Power of Single-Phase Half Wave Diode Rectifier with R Load 

$$\text{fx } P_{(\text{dc})} = \frac{V_{(\text{max})} \cdot I_{\text{max}}}{\pi^2}$$

[Open Calculator !\[\]\(899d8b7697d64725bf017d3296cfcf1b_img.jpg\)](#)


$$\text{ex } 108.6011\text{W} = \frac{221\text{V} \cdot 4.85\text{A}}{\pi^2}$$

15) Peak Load Current in Single Phase Half Wave Diode Rectifier with Inductive Load 

$$\text{fx } I_{\text{max}} = \frac{2 \cdot V_{(\text{max})}}{\omega \cdot L}$$

[Open Calculator !\[\]\(40770d9ed6ed4f1222ebf89a1396e8b2_img.jpg\)](#)

$$\text{ex } 4.850001\text{A} = \frac{2 \cdot 221\text{V}}{30\text{rad/s} \cdot 3.0378\text{H}}$$


16) Ripple Voltage of Single-Phase Half Wave Diode Rectifier with R Load 

$$\text{fx } V_{\text{r(h)}} = 0.3856 \cdot V_{(\text{max})}$$

[Open Calculator !\[\]\(8b0a097b4b9c9c3eeaea0f4289ea77e5_img.jpg\)](#)

$$\text{ex } 85.2176\text{V} = 0.3856 \cdot 221\text{V}$$



17) RMS Load Current of Single Phase Half Wave Diode Rectifier with RE Load 

fx

Open Calculator 

$$I_{Lrms} = \sqrt{\frac{(V_s^2 + E_L^2) \cdot (\pi - (2 \cdot \theta_r)) + V_s^2 \cdot \sin(2 \cdot \theta_d) - 4 \cdot V_{(max)} \cdot E_L \cdot \cos(\theta_d)}{2 \cdot \pi \cdot r^2}}$$

ex

$$6.623671A = \sqrt{\frac{((440V)^2 + (333V)^2) \cdot (\pi - (2 \cdot 0.01rad)) + (440V)^2 \cdot \sin(2 \cdot 84.26^\circ) - 4 \cdot 221V \cdot 333V \cdot \cos(84.26^\circ)}{2 \cdot \pi \cdot (59\Omega)^2}}$$

18) RMS Load Current of Single Phase Half Wave Diode Rectifier with Resistive Load 

fx

Open Calculator 

$$I_{Lrms} = \frac{V_{(max)}}{2 \cdot r}$$

$$1.872881A = \frac{221V}{2 \cdot 59\Omega}$$

19) RMS Output Voltage of Single Phase Half Wave Diode Rectifier with Resistive Load 

fx

Open Calculator 

$$V_{rms(h)} = \frac{V_{(max)}}{2}$$

$$110.5V = \frac{221V}{2}$$










Variables Used

- E_L Load EMF (Volt)
- $I_{avg(f)}$ Average Output Current Full (Ampere)
- $I_{avg(h)}$ Average Output Current Half (Ampere)
- I_L Average Load Current SP (Ampere)
- I_{Lrms} RMS Load Current SP (Ampere)
- I_{max} Peak Load Current (Ampere)
- $I_{out(rms)}$ RMS Output Current (Ampere)
- L Inductance (Henry)
- $P_{(avg)}$ Average Output Power SP (Watt)
- $P_{(dc)}$ DC Power Output SP (Watt)
- r Resistance SP (Ohm)
- $V_{(max)}$ Peak Input Voltage SP (Volt)
- $V_{dc(f)}$ Average Output Voltage Full (Volt)
- $V_{dc(h)}$ Average Output Voltage Half (Volt)
- $V_{r(f)}$ Ripple Voltage Full (Volt)
- $V_{r(h)}$ Ripple Voltage Half (Volt)
- $V_{rms(f)}$ RMS Output Voltage Full (Volt)
- $V_{rms(h)}$ RMS Output Voltage Half (Volt)
- V_s Source Voltage (Volt)
- β_{diode} Diode Extinction Angle (Radian)
- θ_d Diode Turn On Angle Degrees (Degree)
- θ_r Diode Turn On Angle Radians (Radian)
- ω Angular Frequency (Radian per Second)



Constants, Functions, Measurements used

- **Constant:** **pi**, 3.14159265358979323846264338327950288
Archimedes' constant
- **Function:** **cos**, $\cos(\text{Angle})$
Trigonometric cosine function
- **Function:** **sin**, $\sin(\text{Angle})$
Trigonometric sine function
- **Function:** **sqrt**, $\sqrt{\text{Number}}$
Square root function
- **Measurement:** **Electric Current** in Ampere (A)
Electric Current Unit Conversion 
- **Measurement:** **Power** in Watt (W)
Power Unit Conversion 
- **Measurement:** **Angle** in Radian (rad), Degree ($^{\circ}$)
Angle Unit Conversion 
- **Measurement:** **Electric Resistance** in Ohm (Ω)
Electric Resistance Unit Conversion 
- **Measurement:** **Inductance** in Henry (H)
Inductance Unit Conversion 
- **Measurement:** **Electric Potential** in Volt (V)
Electric Potential Unit Conversion 
- **Measurement:** **Angular Frequency** in Radian per Second (rad/s)
Angular Frequency Unit Conversion 



Check other formula lists

- [Single Phase Uncontrolled Rectifiers Formulas](#) 
- [Three Phase Uncontrolled Rectifiers Formulas](#) 

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