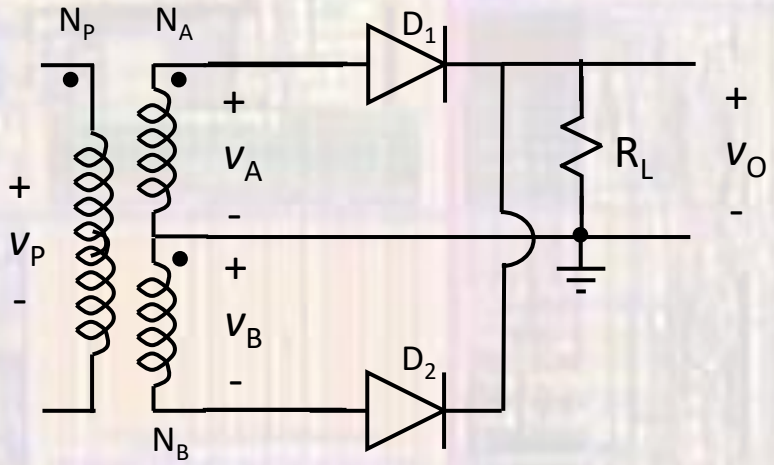
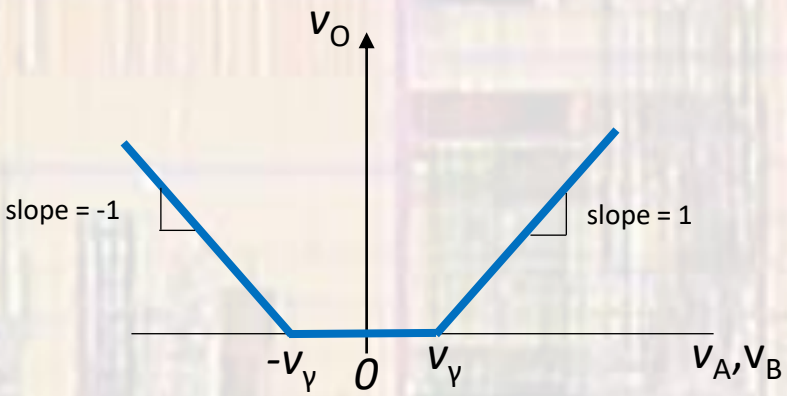
Full-Wave Rectifier

Last updated 12/9/21

Full-Wave Rectifier

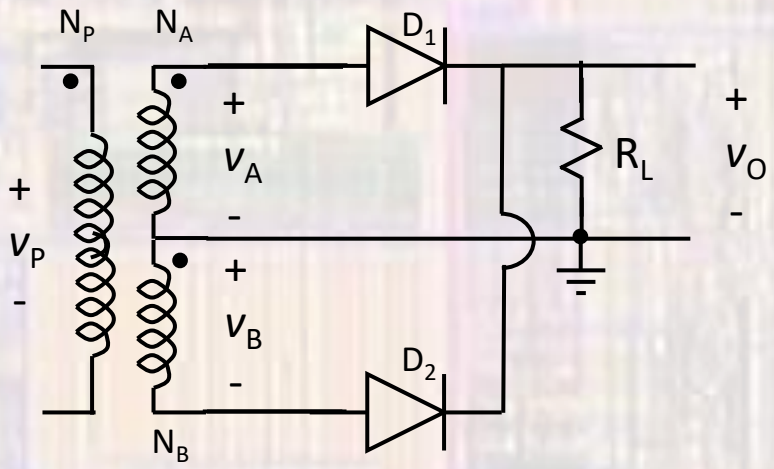
- Basic Implementation

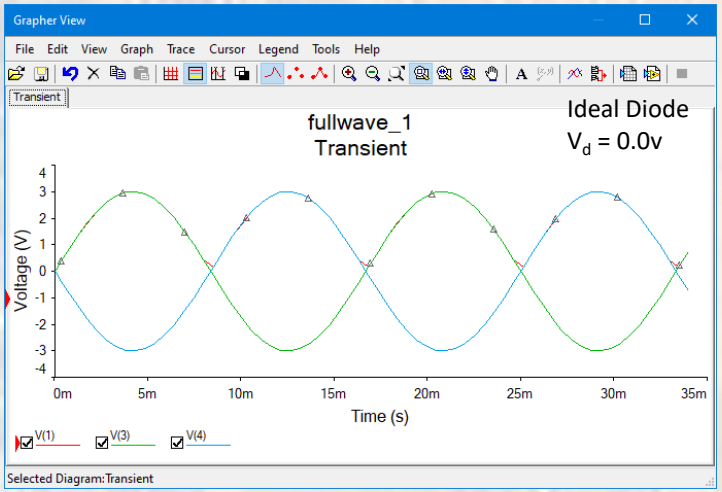


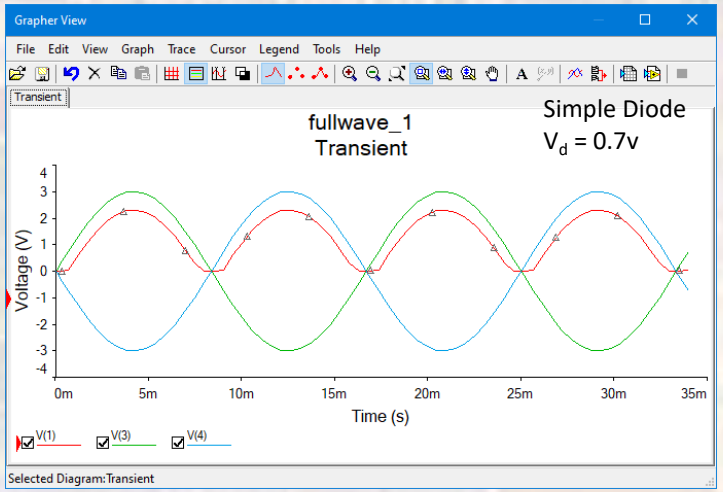


Full-Wave Rectifier

- Basic Implementation

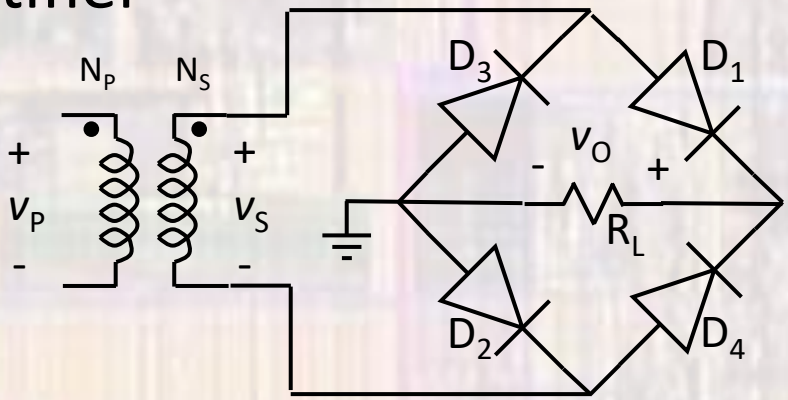




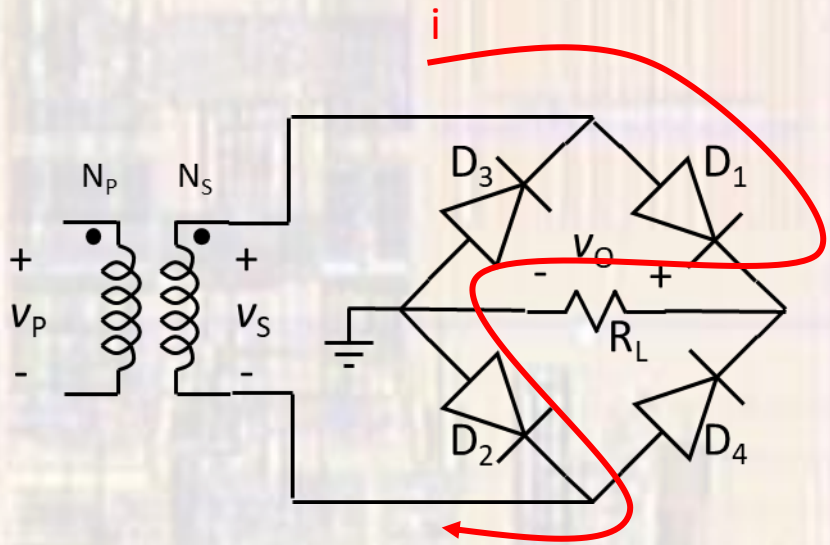


Full-Wave Rectifier

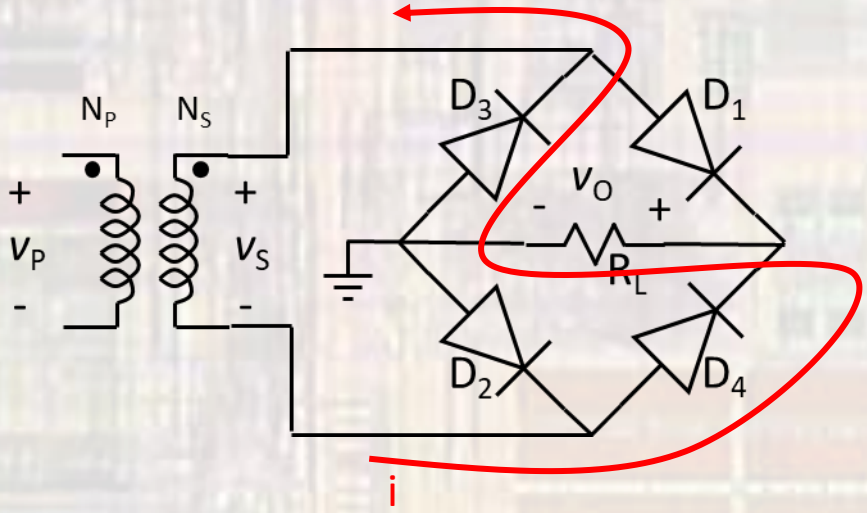
- Bridge Rectifier



Positive voltage and current to the load in both half cycles



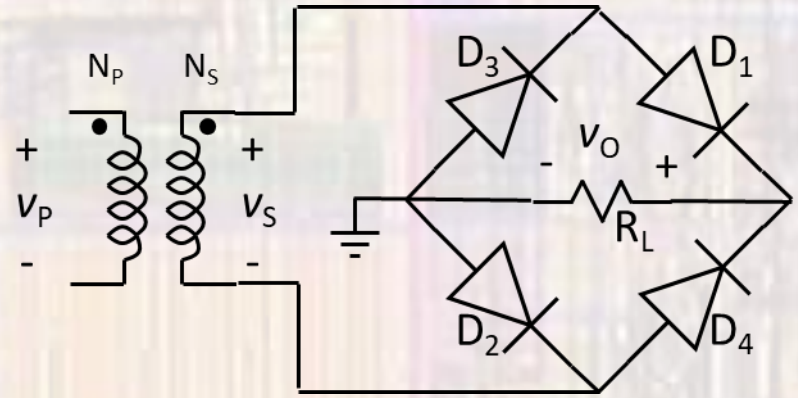
Positive half cycle

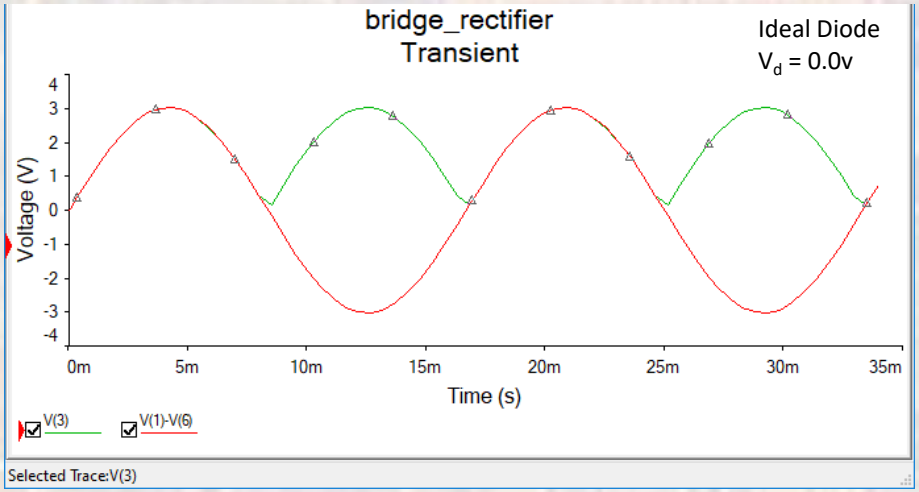


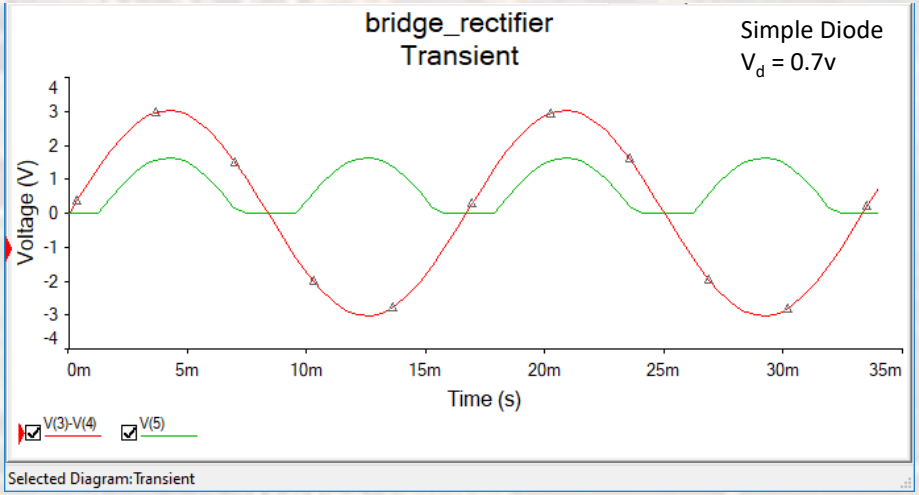
Negative half cycle

Full-Wave Rectifier

- Bridge Rectifier

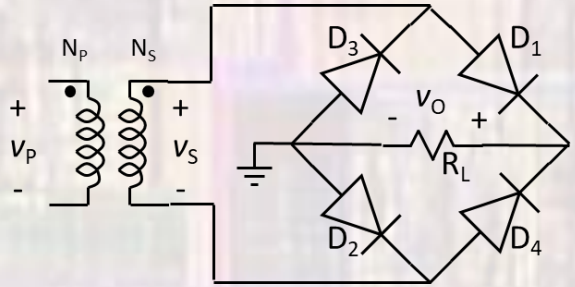


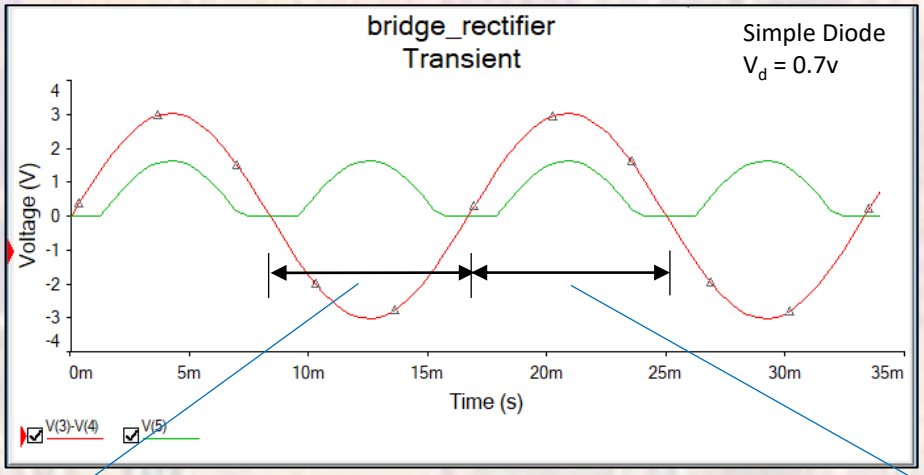




Full-Wave Rectifier

- Bridge Rectifier



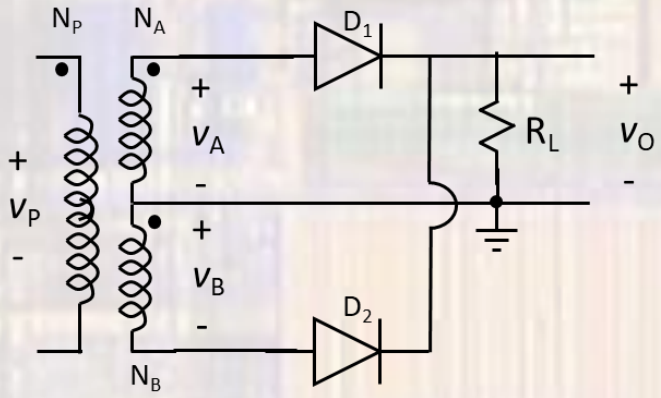


Reversed biased region D1,D2
$v_D max = -v_S peak / 2$
→ breakdown requirement

Forward biased region D1, D2
$i_D max = (v_S peak – 2v_D)/R$
→ current requirement

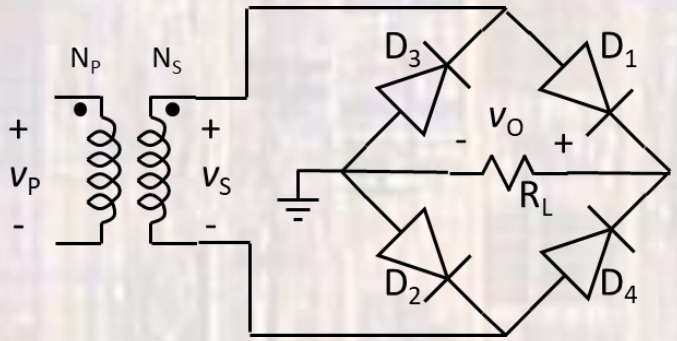
Full-Wave Rectifier

- Comparison



Lower voltage drop – 1 v_D
Fewer active components – 2 diodes
More complex transformer - $$

transformer - $16
diodes - $0.10



Higher voltage drop – 2 v_D
More active components – 4 diodes
Less complex transformer - $

transformer - $10
diodes - $0.20

Full-Wave Rec

- Real world

DIODES INCORPORATED

1N4001G - 1N4007G

1.0A GLASS PASSIVATED RECTIFIER

Features and Benefits

- Glass Passivated Die Construction
- High Current Capability and Low Forward Voltage Drop
- Surge Overload Rating to 30A Peak
- **Lead Free Finish, RoHS Compliant (Note 1)**

Mechanical Data

- Case: DO-41 Plastic
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Tin. Plated Leads Solderable per MIL-STD-202, Method 208 (e3)
- Polarity: Cathode Band
- Marking: Type Number
- Weight: 0.30 grams (approximate)

Ordering Information (Note 2)

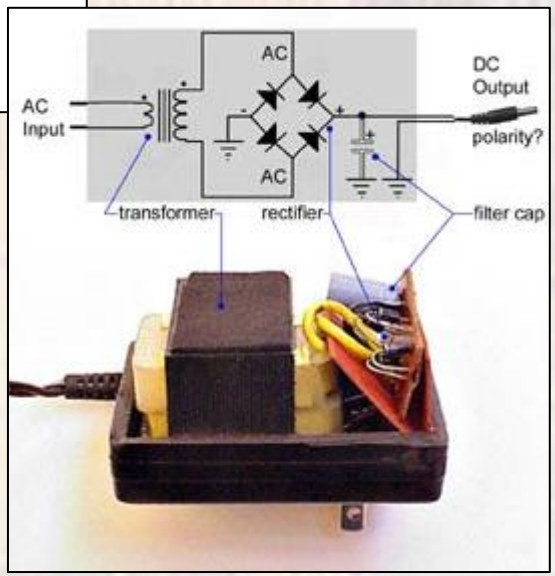
Device	Packaging	Shipping
1N4001G-T	DO-41 Plastic	5K/Tape & Reel, 13-inch
1N4002G-T	DO-41 Plastic	5K/Tape & Reel, 13-inch
1N4003G-T	DO-41 Plastic	5K/Tape & Reel, 13-inch
1N4004G-T	DO-41 Plastic	5K/Tape & Reel, 13-inch
1N4005G-T	DO-41 Plastic	5K/Tape & Reel, 13-inch
1N4006G-T	DO-41 Plastic	5K/Tape & Reel, 13-inch
1N4007G-T	DO-41 Plastic	5K/Tape & Reel, 13-inch

Maximum Ratings and Electrical Characteristics @T_A = 25°C unless otherwise specified

Single phase, half wave, 60Hz, resistive or inductive load.
For capacitive load, derate current by 20%.

Characteristic	Symbol	1N4001 G	1N4002 G	1N4003 G	1N4004 G	1N4005 G	1N4006 G	1N4007 G	Unit
Peak Repetitive Reverse Voltage Working Peak Reverse Voltage DC Blocking Voltage	V_{RRM} V_{RWM} V_R	50	100	200	400	600	800	1000	V
RMS Reverse Voltage	$V_{R(RMS)}$	35	70	140	280	420	560	700	V
Average Rectified Output Current (Note 3) @ T_A = 75°C	I_O	1.0							A
Non-Repetitive Peak Forward Surge Current 8.3ms single half sine-wave superimposed on rated load	I_{FSM}	30							A
Forward Voltage @ I_F = 1.0A	V_{FM}	1.0							V
Peak Reverse Current @T_A = 25°C at Rated DC Blocking Voltage @ T_A = 125°C	I_{RM}	5.0 50							μA
Typical Reverse Recovery Time (Note 4)	t_{rr}	2.0							μs
Typical Total Capacitance (Note 5)	C_T	8.0							pF
Typical Thermal Resistance Junction to Ambient	$R_{\theta JA}$	100							°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-65 to +175							°C

Notes: 1. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied, see EU Directive 2002/95/EC Annex Notes.
2. For packaging details, visit our website at http://www.diodes.com.
3. Leads maintained at ambient temperature at a distance of 9.5mm from the case.
4. Measured with I_F = 0.5A, I_R = -1A, I_{rr} = 0.25A.
5. Measured at 1.0 MHz and applied reverse voltage of 4.0V DC.



TRIAD MAGNETICS

POWER TRANSFORMER
Chassis Mount: Single Secondary

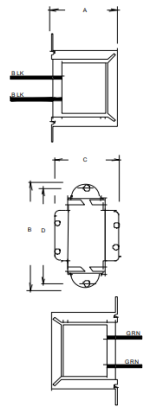
F-13X

Electrical Specifications (@25C)
1. Maximum Power: 3.78 VA
2. Primary: 115V 50/60 Hz
3. Secondary: 6.3V @ 0.68 Amps
4. Voltage Regulation: 30 % TYP @ full load to no load
5. Temperature Rise: 35C TYP (45C MAX allowed)

Description:
The F-13X is part of a series which has a long history of reliable service in the field, made from a proven design and constructed with UL recognized materials.

Construction:
Wound on a single channel nylon bobbin. Materials are UL recognized, Class B (130° C) rated.

Safety:
These products are 100% hipot tested with an insulation of 1500V between primary and secondary windings as well as between the primary / secondary windings and the core.



Dimensions: Units: In inches

A	B	C	D
1.375	2.375	1.375	2.00

Mounting Hole Diameter: .187 in
Lead length: 7.0 inches ± 1 inch
Weight: 0.37 lbs

Schematic:

Primary: Black to Black
Secondary: Green to Green

RoHS Compliance: As of manufacturing date February 2016, all standard products meet the requirements of 2015/863/EU, known as the RoHS 3 initiative.

* Upon printing, this document is considered "uncontrolled". Please contact Triad Magnetics' website for the most current version.

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