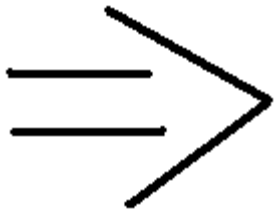
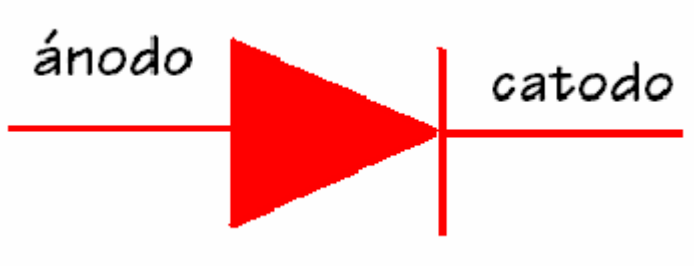
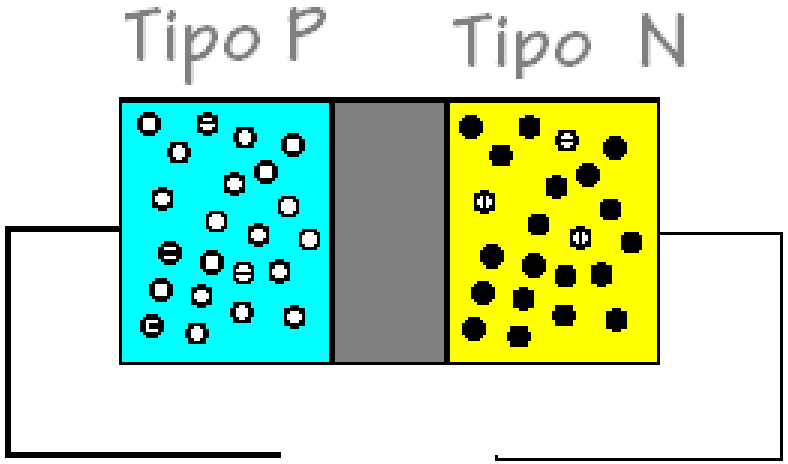
SEMICONDUCTORES

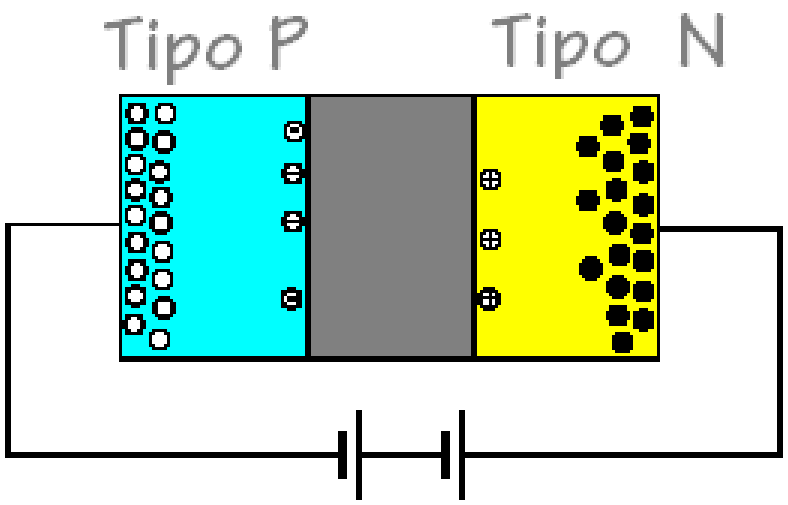
EL DIODO

SIMBOLO






Tipo P
Tipo N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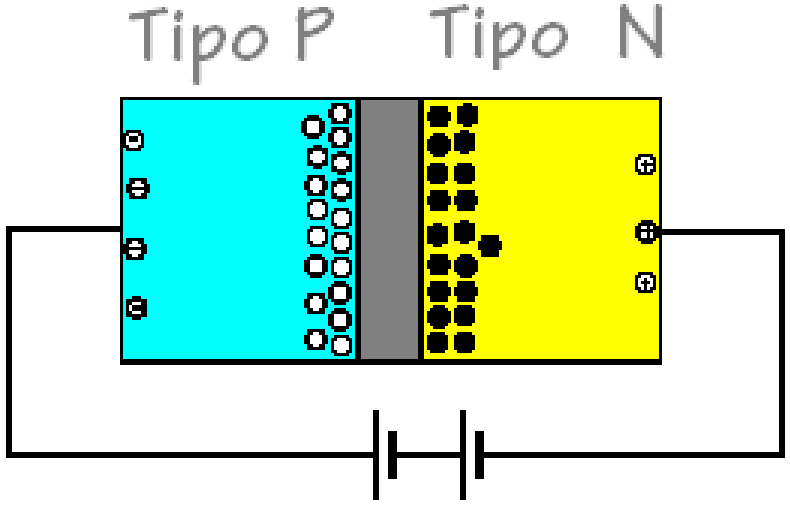
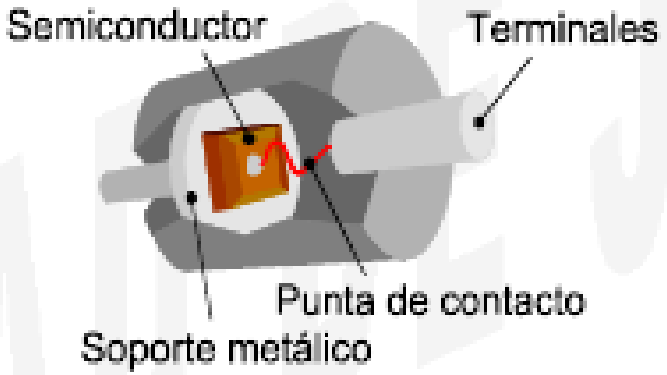
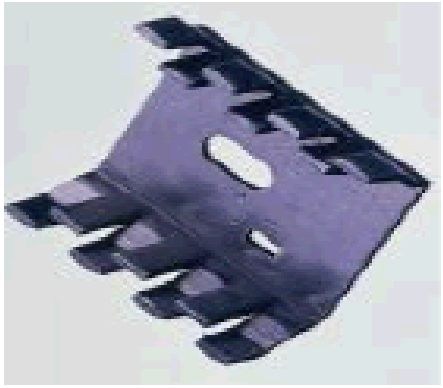

Tipo P
Tipo N

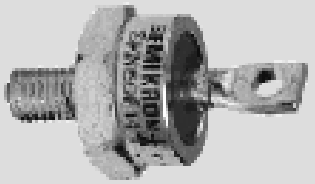


DISIPADOR DE CALOR



1500V
168A

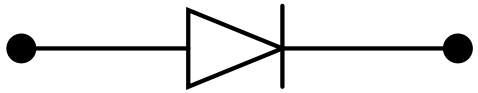
Encapsulado cerámico
600V/6000A



Tipos de diodos

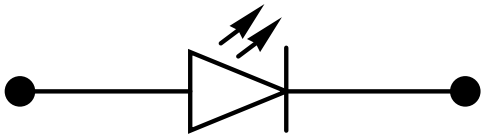
Diodo rectificador

- En P.D. conduce corriente. En P.I. no conduce



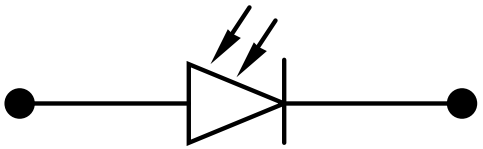
Diodo LED

- En P.D. conduce corriente y emite luz.
- En P.I. no conduce corriente y no emite luz.



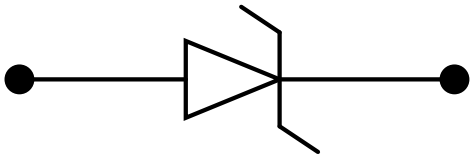
Fotodiodo

- Opuesto al anterior. En P.I. absorbe luz detectada y conduce corriente



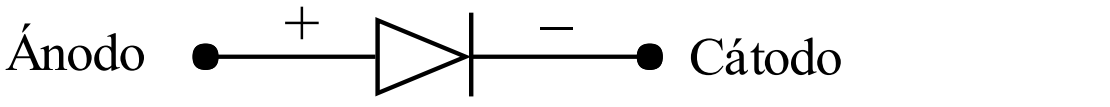
Diodo Zener

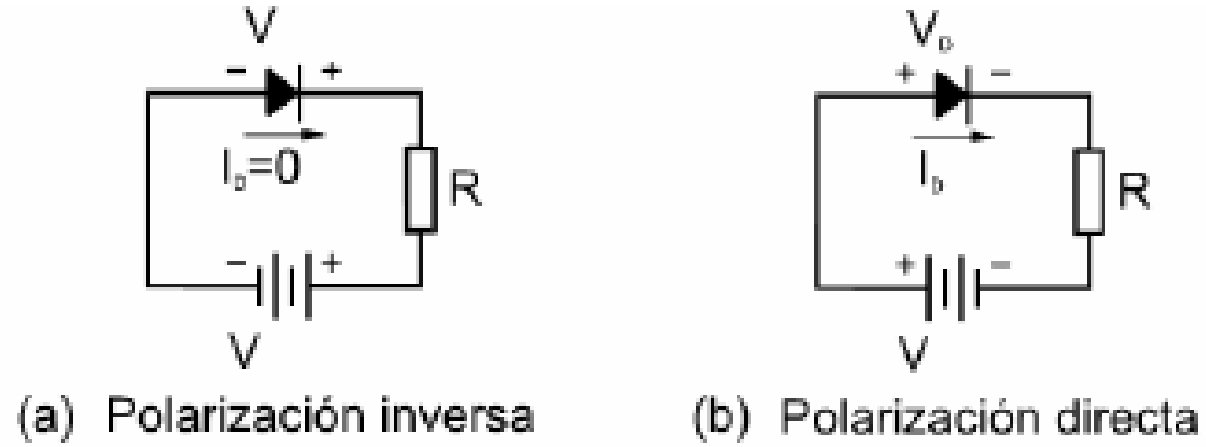
- En P.D. como el diodo rectificador
- En P.I., si se supera cierta tensión (tensión Zener) conduce también.



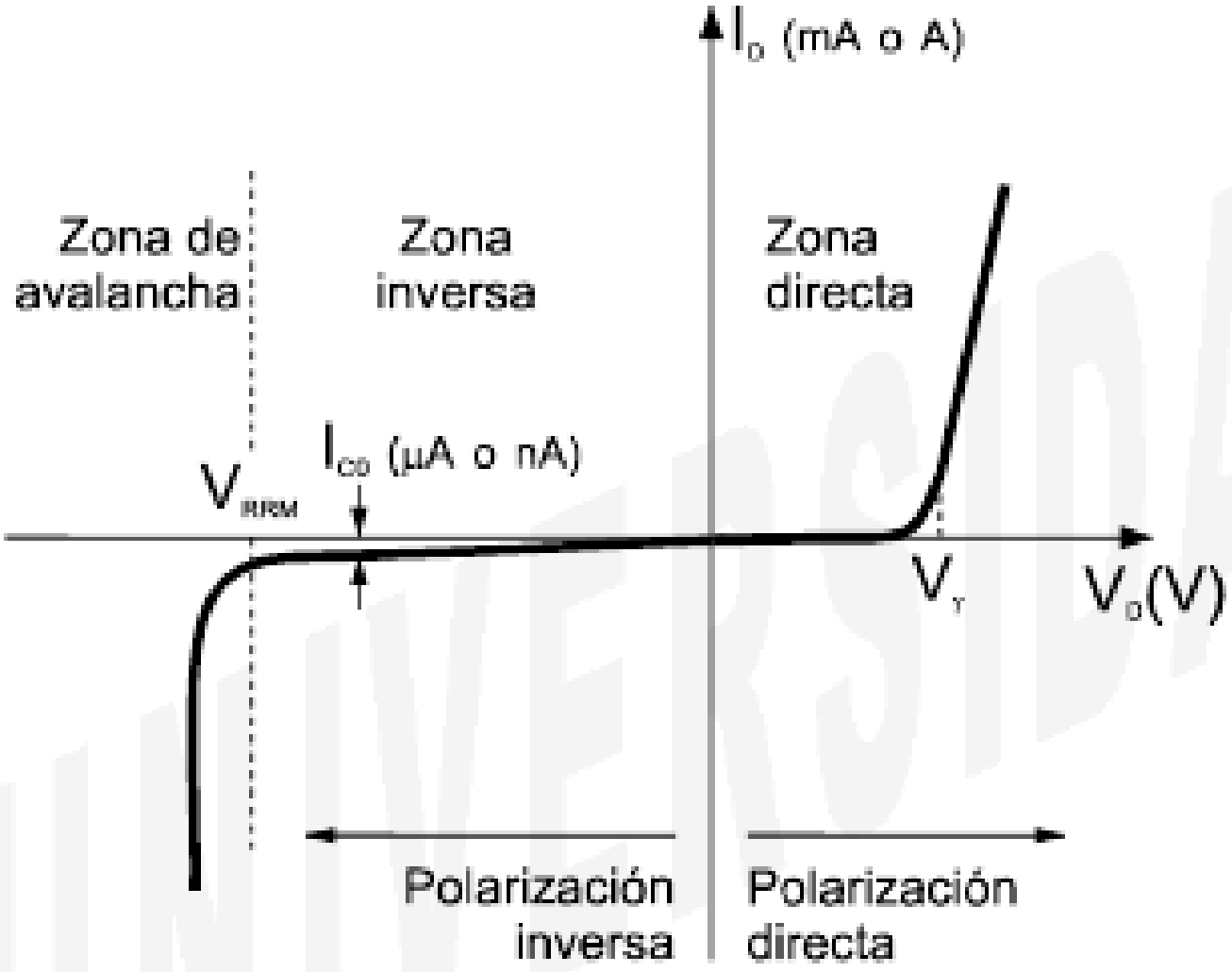
Características. Símbolo

- **Diodo semiconductor: unión PN. Referencia: diodos de silicio (Si)**
- **Elemento biterminal. Terminales diferentes.**

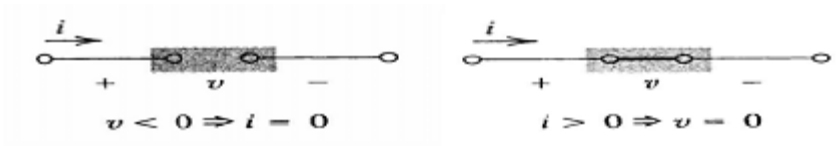


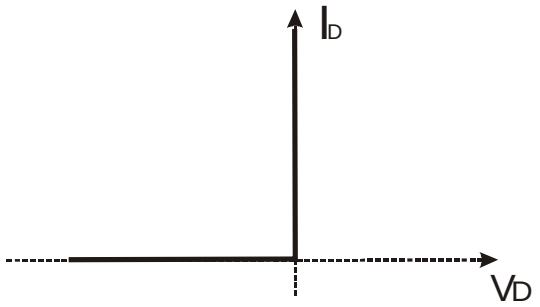


Característica real de un diodo

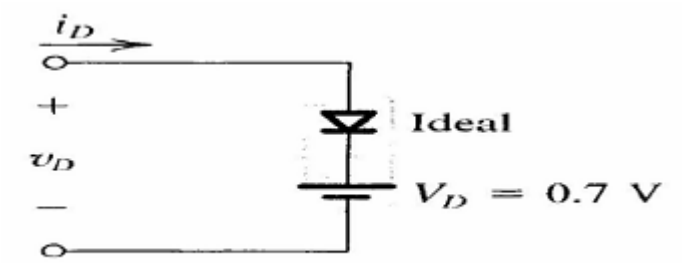


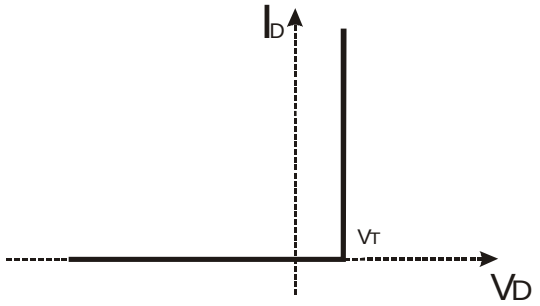
Modelo Ideal



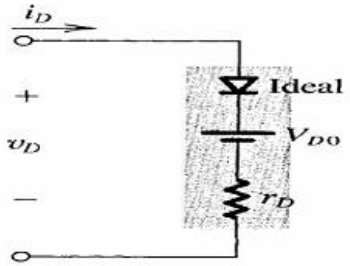


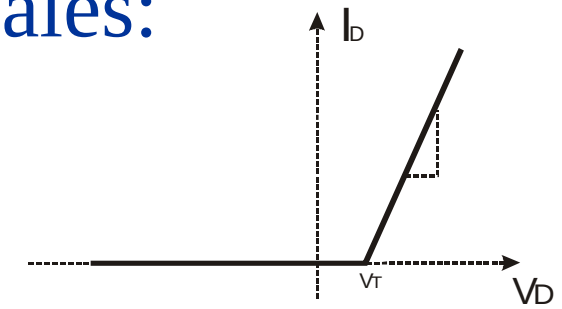
Modelo Simplificado:

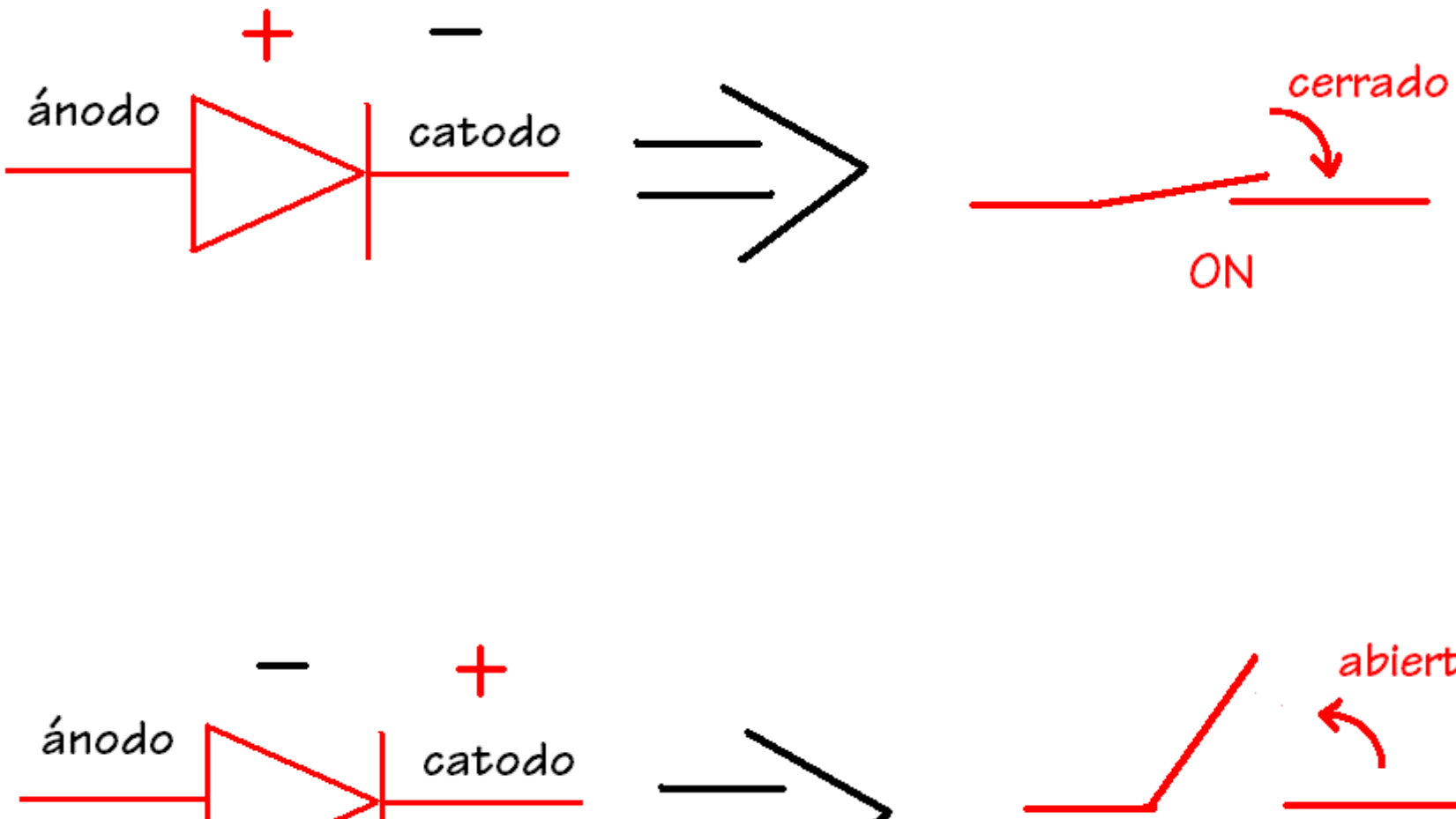




Modelo de segmentos líneales:






+
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ON
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+
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catodo
abierto
OFF

1N4001 - 1N4007

DO-41
COLOR BAND DENOTES CATHODE

General Purpose Rectifiers

Absolute Maximum Ratings*

T_A = 25°C unless otherwise noted

Symbol	Parameter	Value							Units
		4001	4002	4003	4004	4005	4006	4007	
V_{RRM}	Peak Repetitive Reverse Voltage	50	100	200	400	600	800	1000	V
$I_{F(AV)}$	Average Rectified Forward Current, .375 " lead length @ T_A = 75°C	1.0							A
I_{FSM}	Non-repetitive Peak Forward Surge Current 8.3 ms Single Half-Sine-Wave	30							A
T_{stg}	Storage Temperature Range	-55 to +175							°C
T_J	Operating Junction Temperature	-55 to +175							°C

*These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

Thermal Characteristics

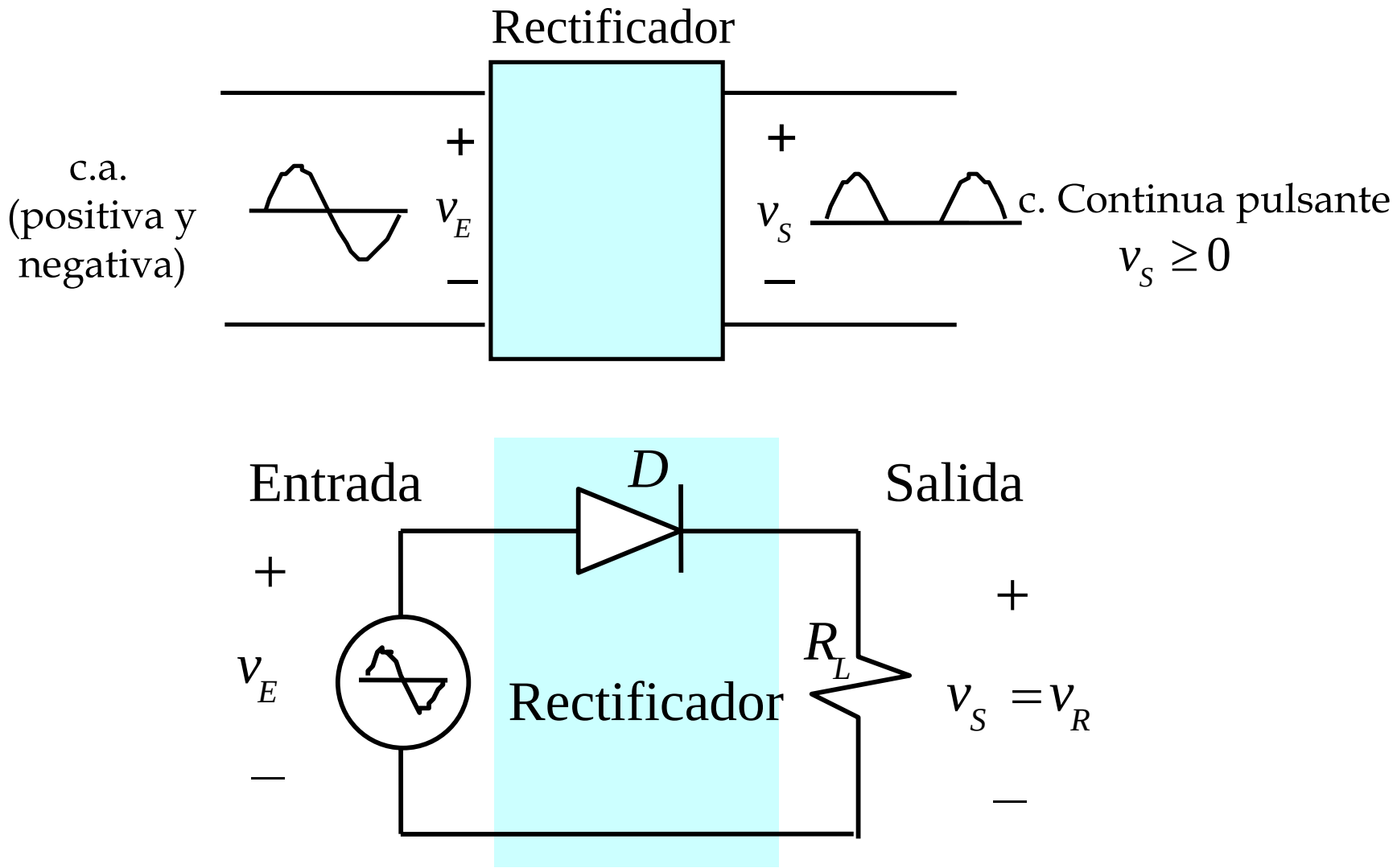
Symbol	Parameter	Value	Units
P_D	Power Dissipation	3.0	W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	50	°C/W

Electrical Characteristics

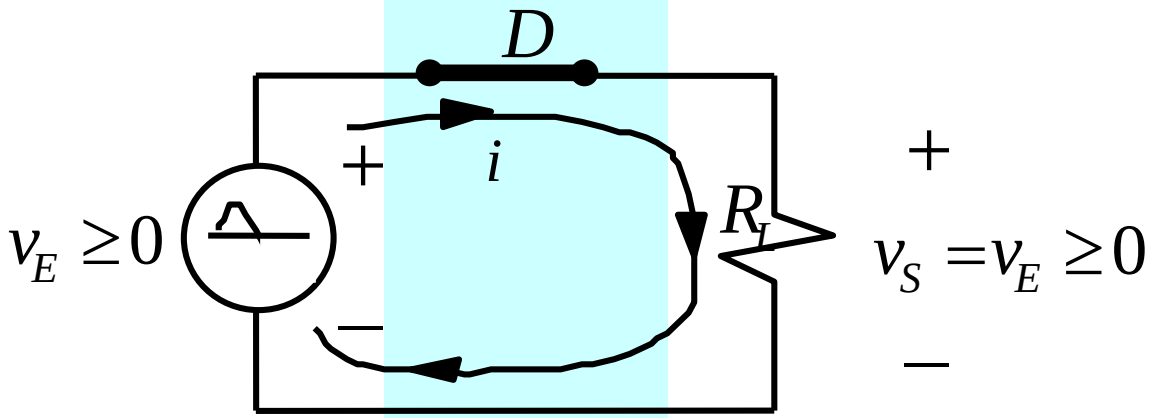
T_A = 25°C unless otherwise noted

Symbol	Parameter	Device							Units
		4001	4002	4003	4004	4005	4006	4007	
V_F	Forward Voltage @ 1.0 A	1.1							V
I_{rr}	Maximum Full Load Reverse Current, Full Cycle T_A = 75°C	30							µA
I_R	Reverse Current @ rated V_R T_A = 25°C	5.0							µA
	T_A = 100°C	500							µA
C_T	Total Capacitance V_R = 4.0 V, f = 1.0 MHz	15							pF

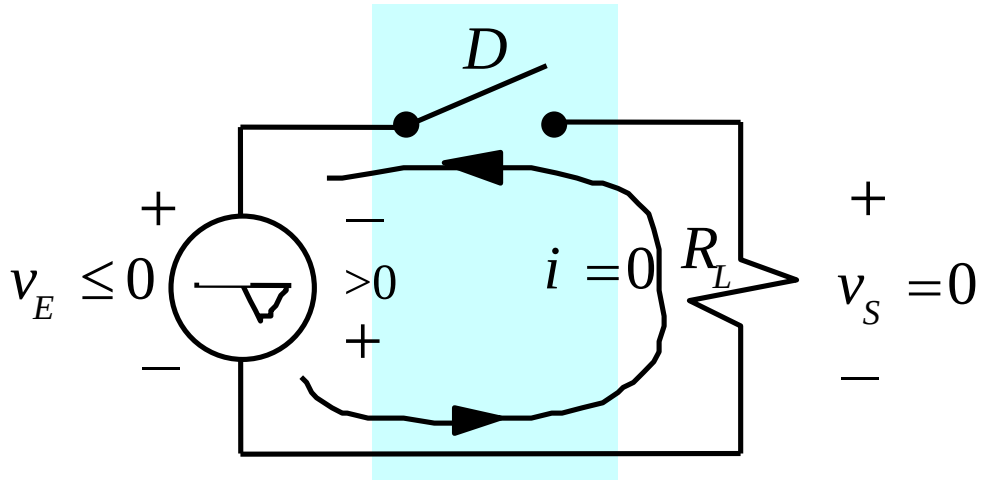
Rectificador de media onda

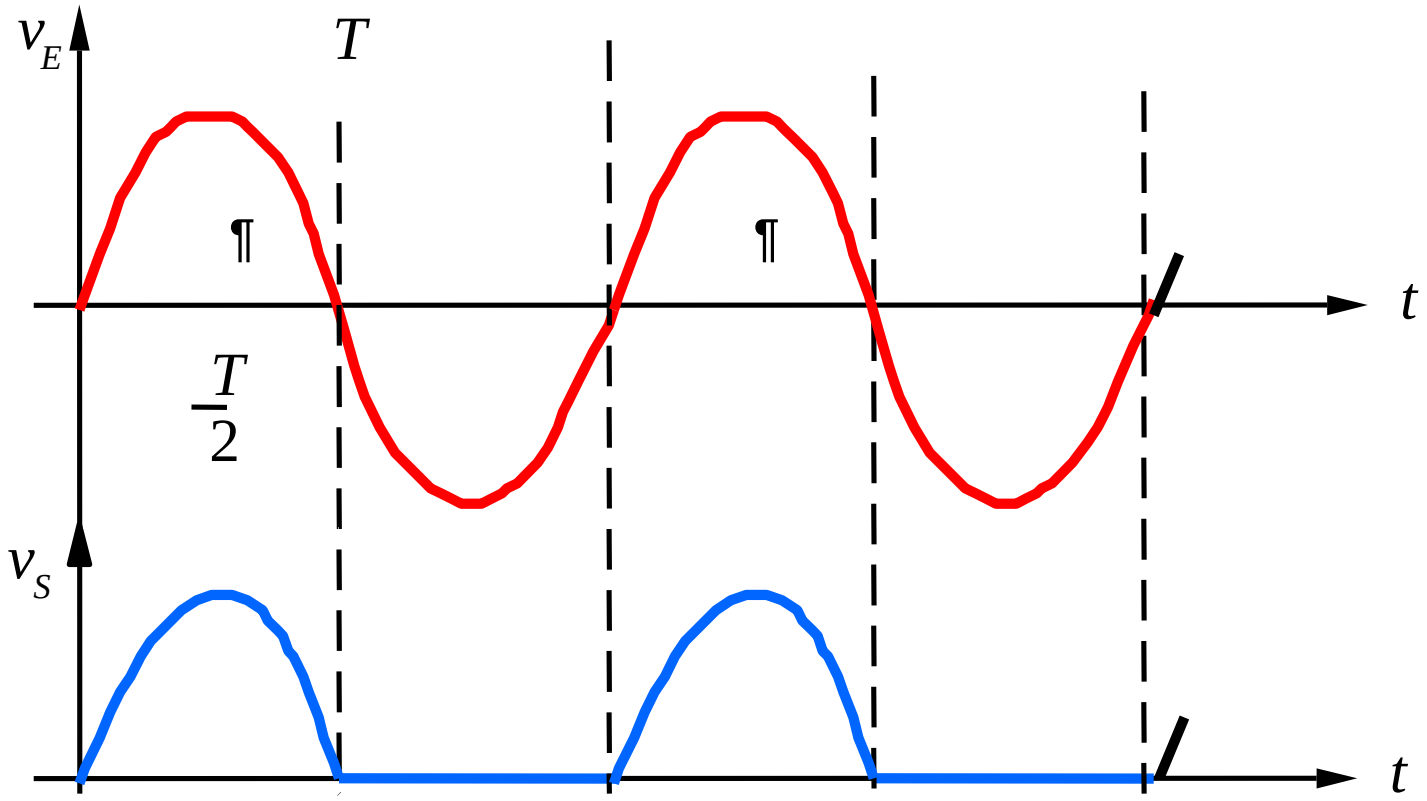


1.- $V_E > 0 \rightarrow i > 0 \qquad 0 \leq t \leq T/2$

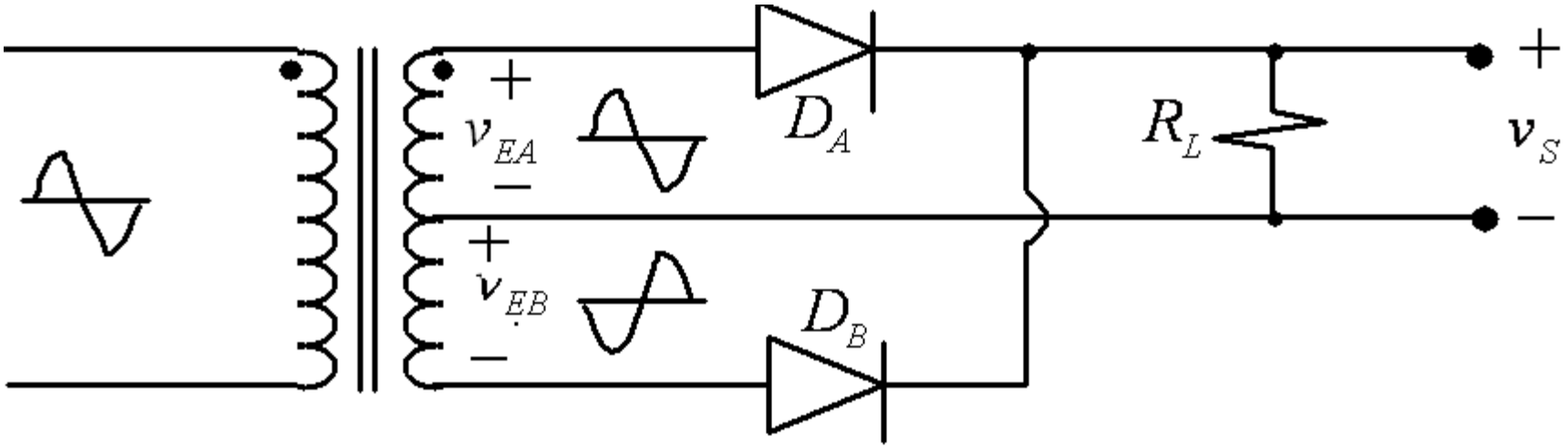


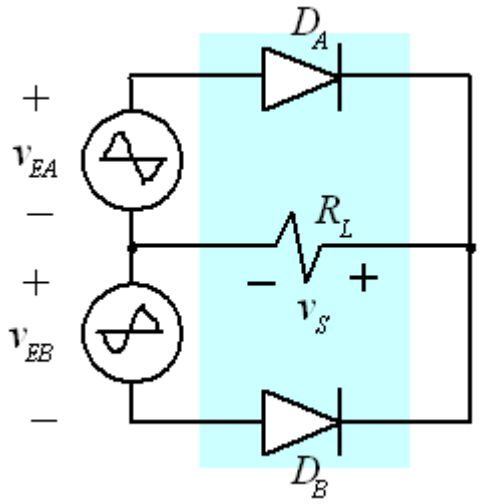
2.- $V_E < 0 \rightarrow i = 0 \qquad T/2 \leq t \leq T$

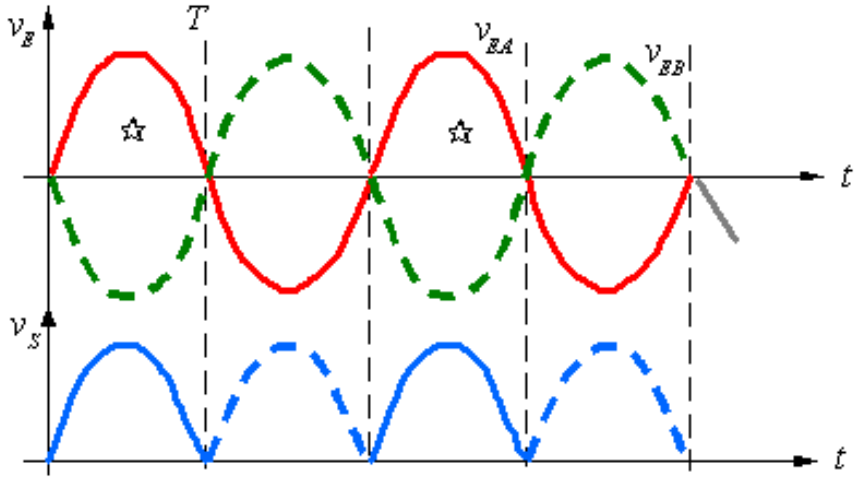



v_E
T
¶
¶
t
$\frac{T}{2}$
v_S
t

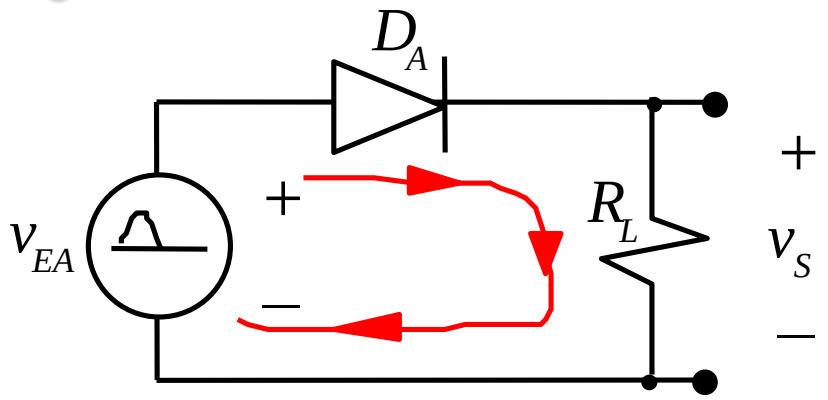
Rectificador de onda completa punto medio



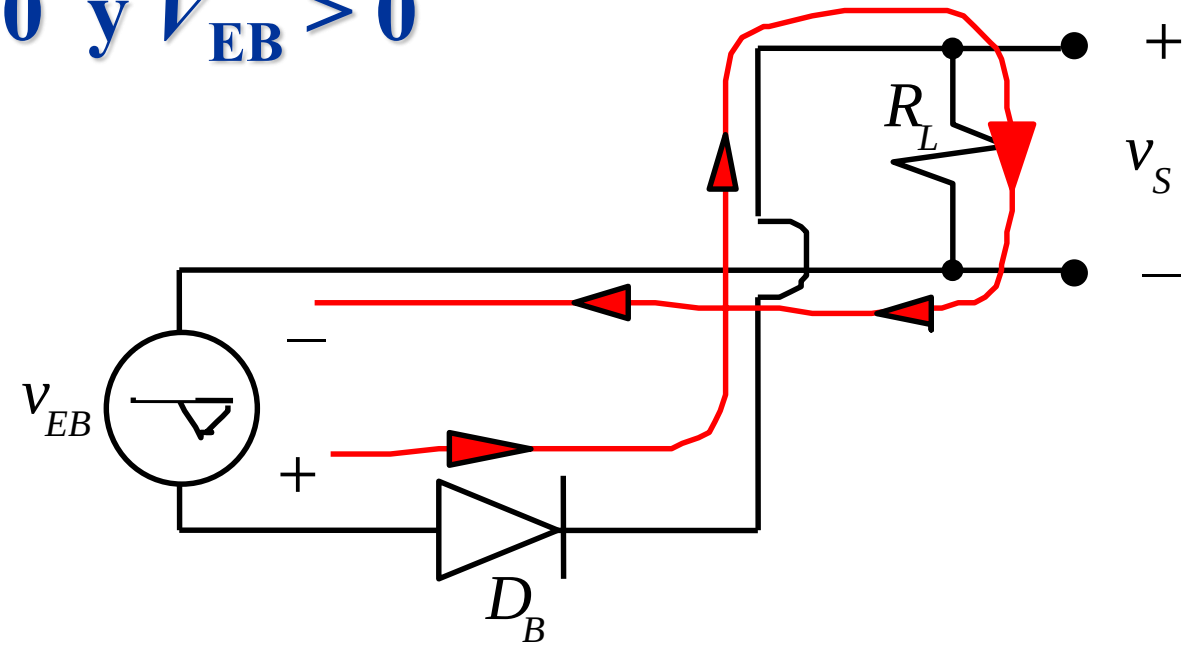




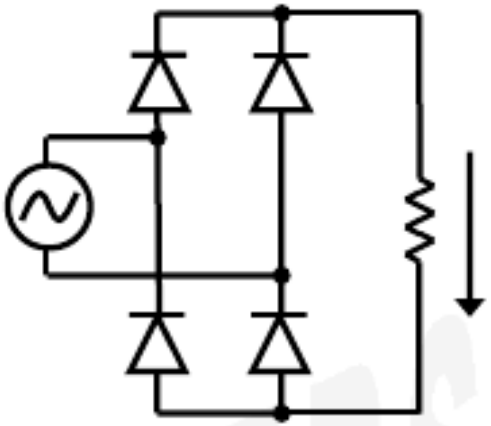
1.- $V_{EA} > 0$ y $V_{EB} < 0$

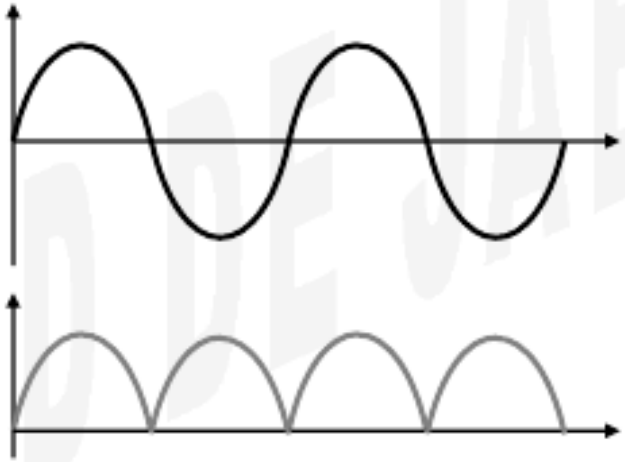


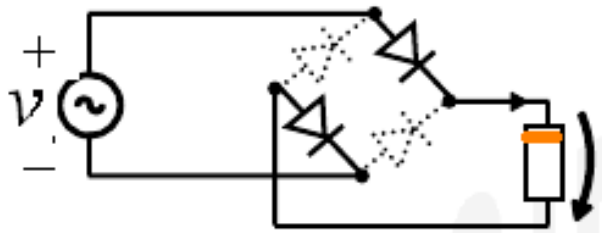
2.- $V_{EA} < 0$ y $V_{EB} > 0$

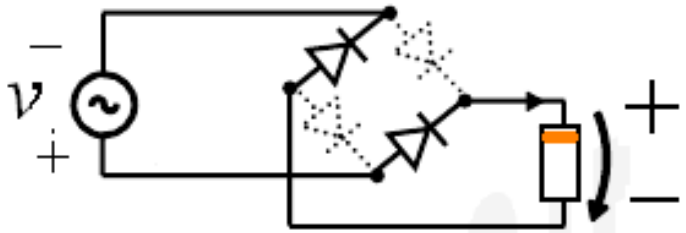


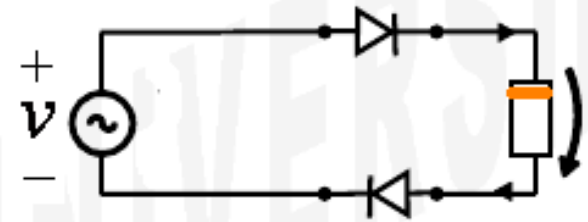
Rectificador de onda completa puente

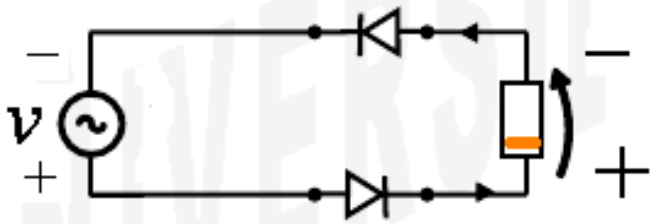






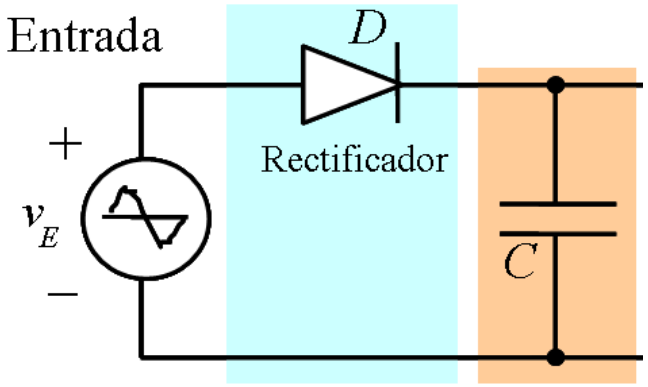


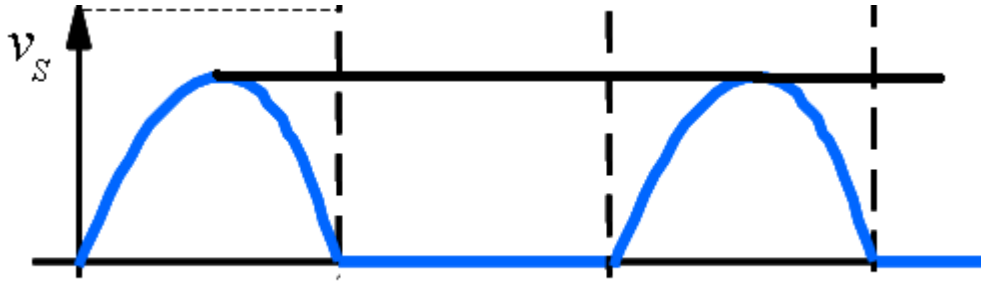




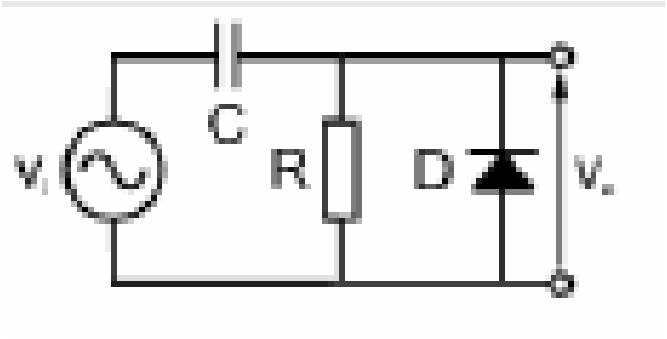
APLICACIONES DEL DIODO

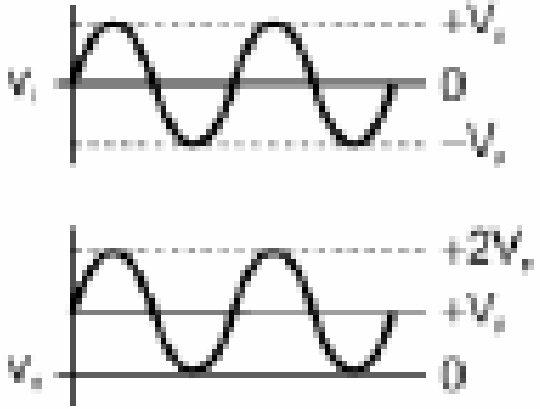
Rectificador de pico



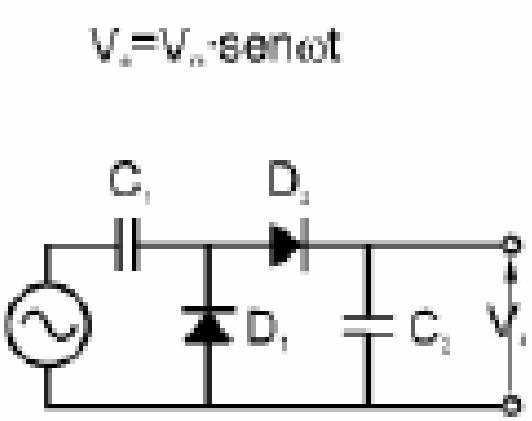


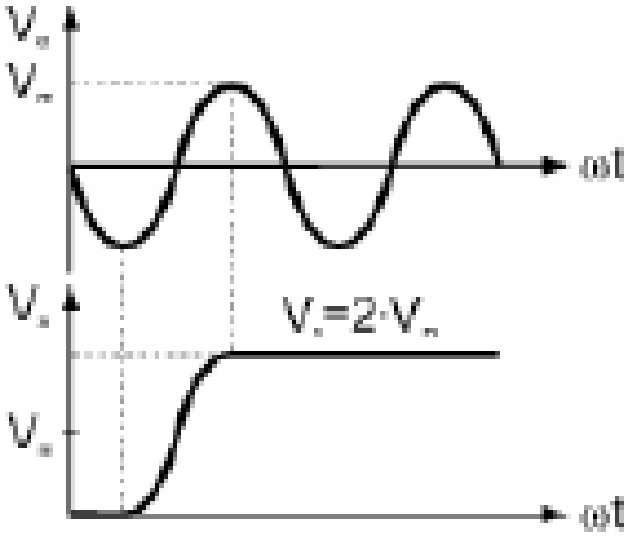
Enclavador o fijador de picos



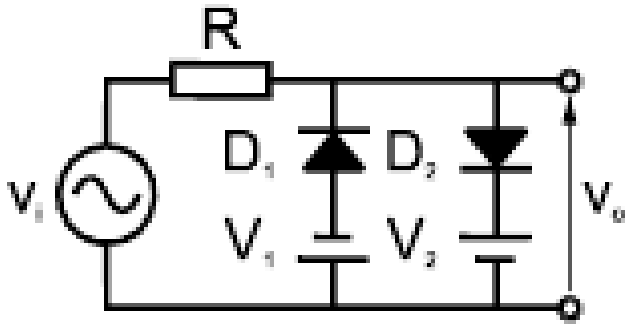


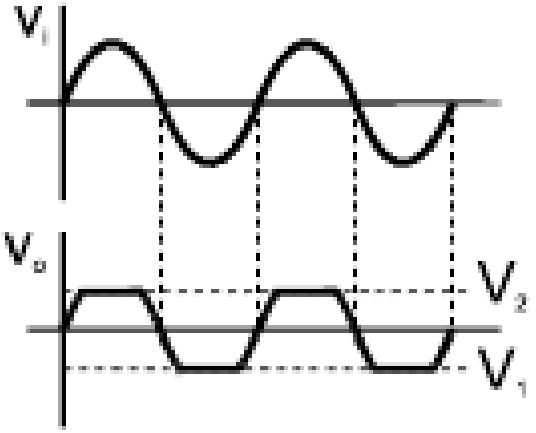
Doblador de tensión



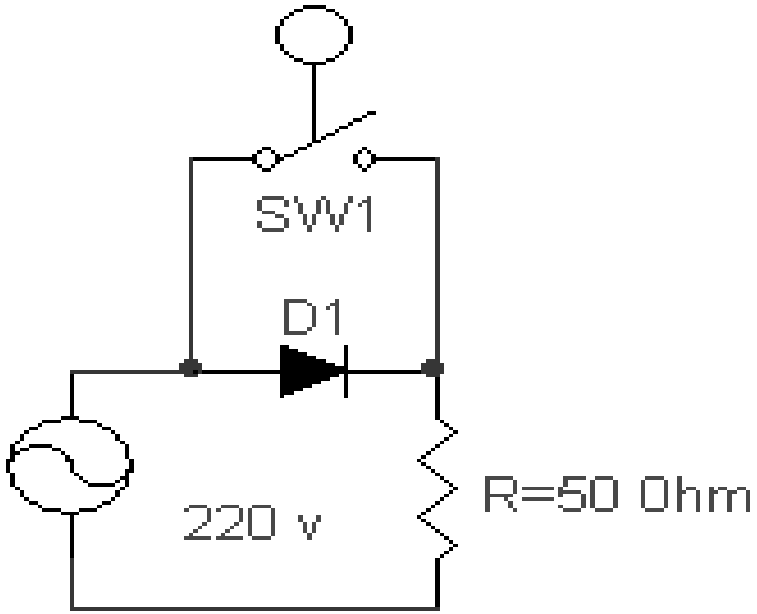


Limitador de tensión

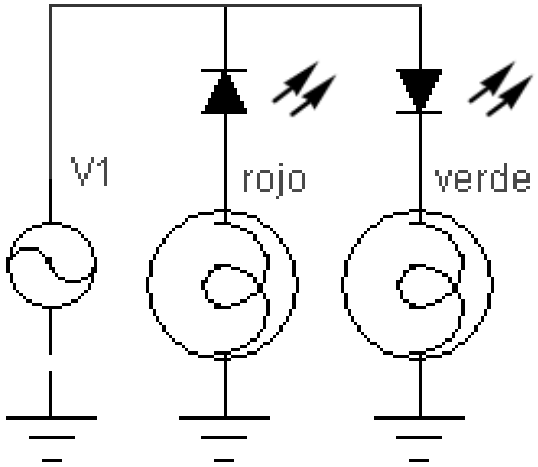




Calcular la potencia que disipa R con la llave abierta y cerrada.



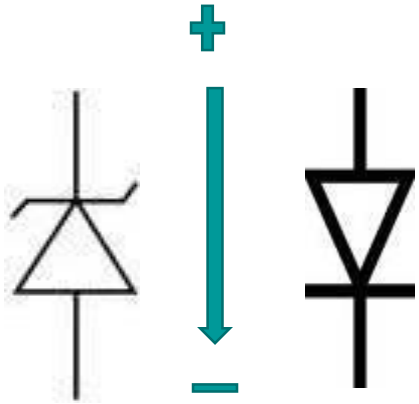
Vi = 6v b) Vi = - 6v c) Vi = 6 sen wt d) Vi = 0v



Diodo Zener

Este diodo se diferencia de un diodo semiconductor de propósito general, trabaja en la región de polarización negativa. Es decir que la dirección de la conducción es opuesta a la de la flecha sobre el símbolo.

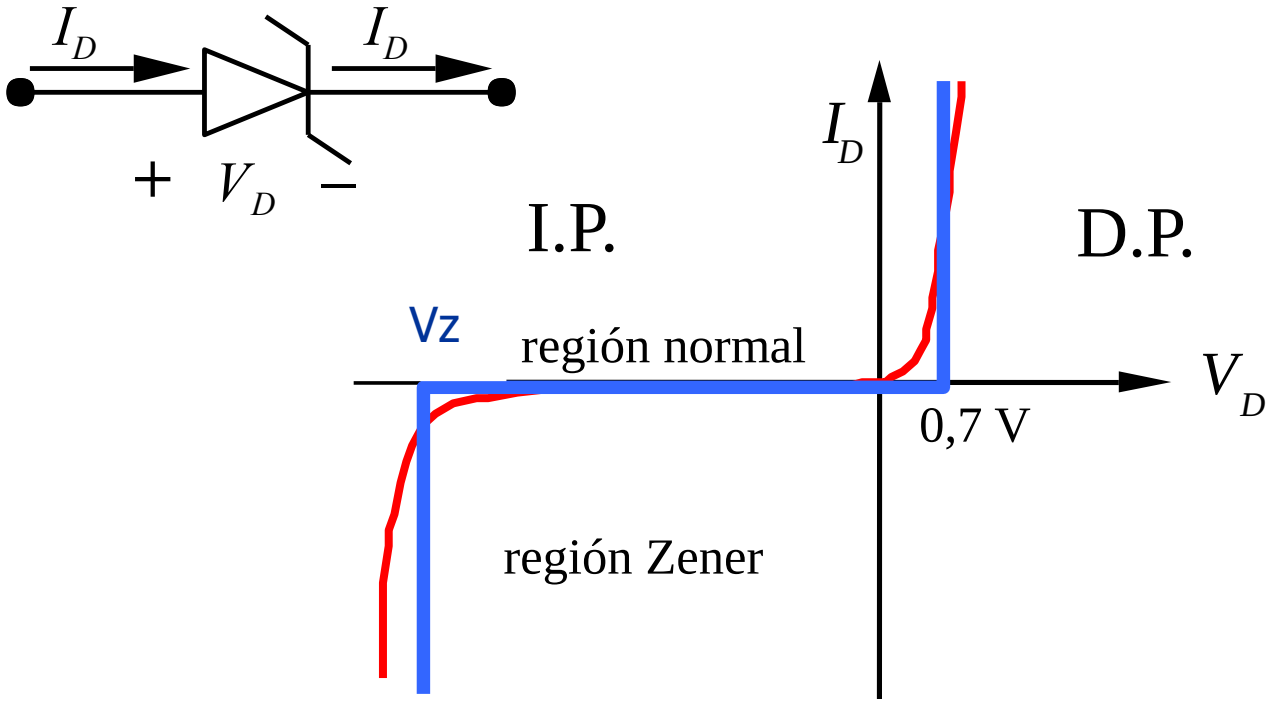
El voltaje Zener es muchas veces menor que V ruptura de un diodo semiconductor, este control se logra con la variación de los niveles de dopado. Los voltajes zener van desde 1.8 V. hasta 200V, con rangos de potencia de ¼ W hasta 50W.



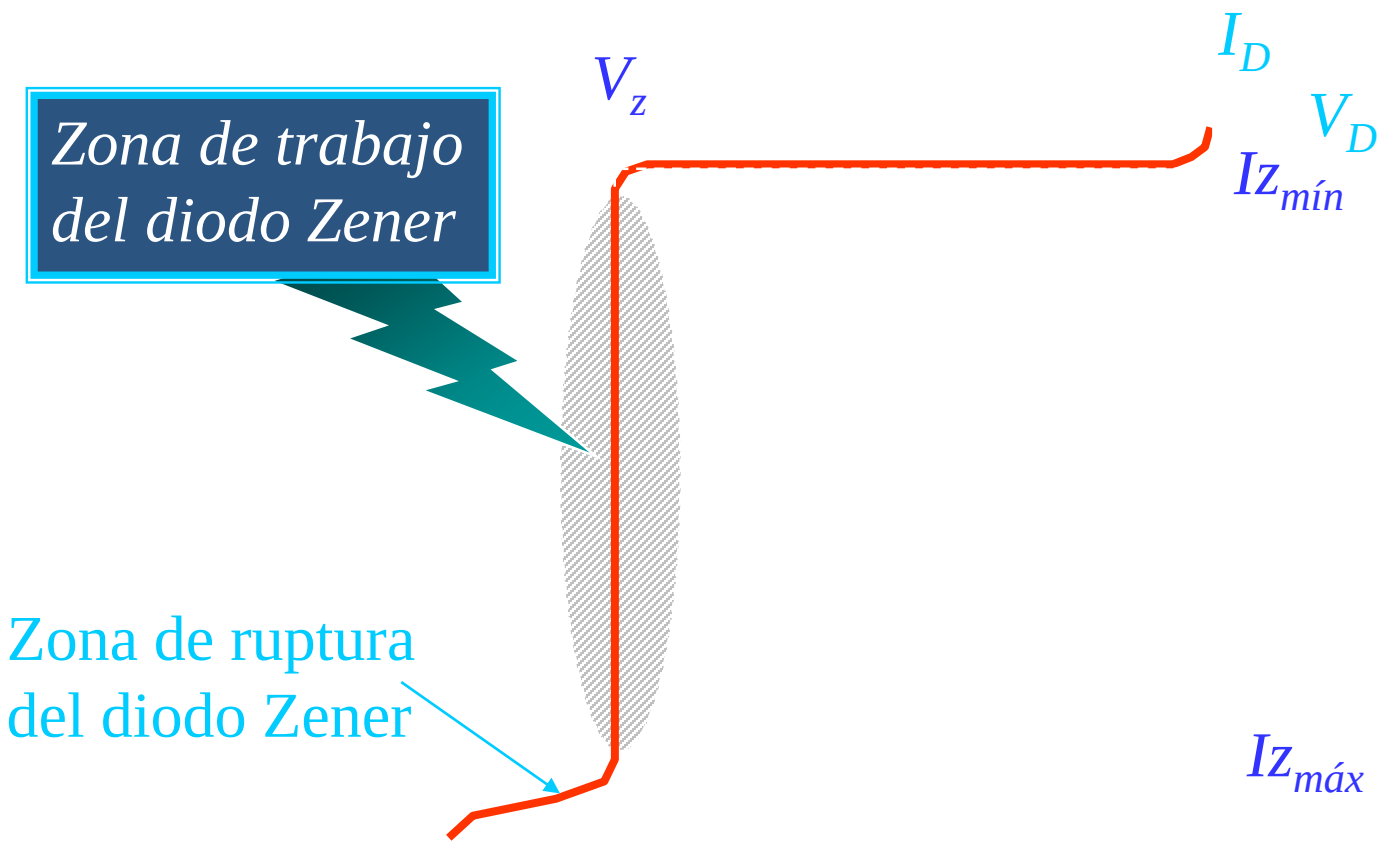
Aproximaciones lineales del diodo Zener

En P.D. se comporta igual a un diodo rectificador

En P.I. al llegar a la tensión Zener, conduce corriente en sentido contrario

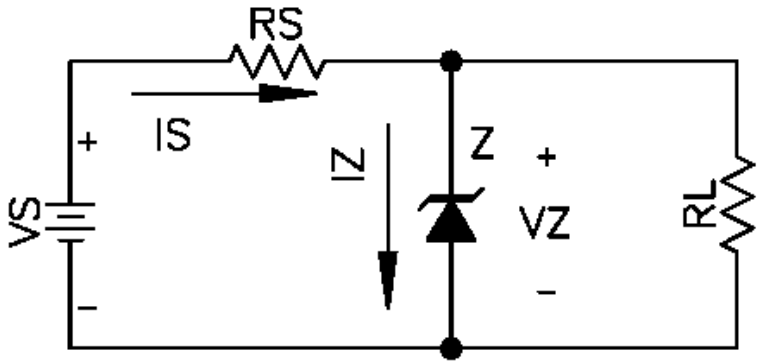


La siguiente representa la curva característica de un diodo Zener



REGULADOR DE TENSION CON ZENER

- Objetivo: mantener la tension sobre la carga constante y de valor V_Z.



$$R_S < \frac{V_{SMIN} - V_Z}{I_{LMAX} + I_{ZMIN}}$$

$$R_S > \frac{V_{SMAX} - V_Z}{I_{LMIN} + I_{ZMAX}}$$