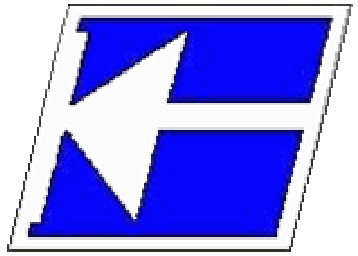
Centro Federal de Educação Tecnológica de Santa Catarina
Departamento de Eletrônica
Curso Superior de Sistemas Digitais



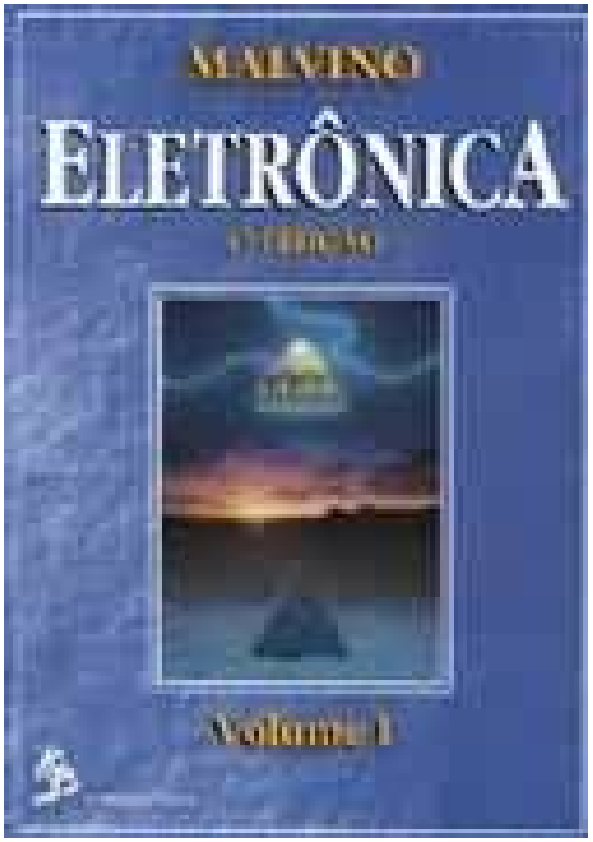
Retificadores

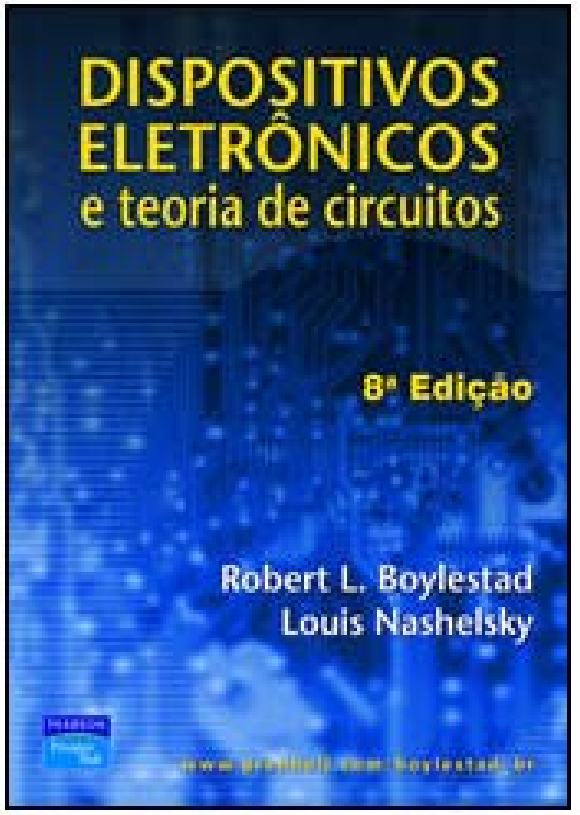
Diodos e dispositivos especiais
Parte 2

Prof. Clóvis Antônio Petry.

Florianópolis, maio de 2007.

Bibliografia para esta aula





www.cefetsc.edu.br/~petry

Nesta aula

Seqüência de conteúdos:

1. Parte C – Diodos:
   - LEDs;
   - Fotodiodos;
2. Parte D – Transistores:
   - Fototransistores;
   - Optoacopladores;
3. Parte E – Outros dispositivos:
   - Células solares.

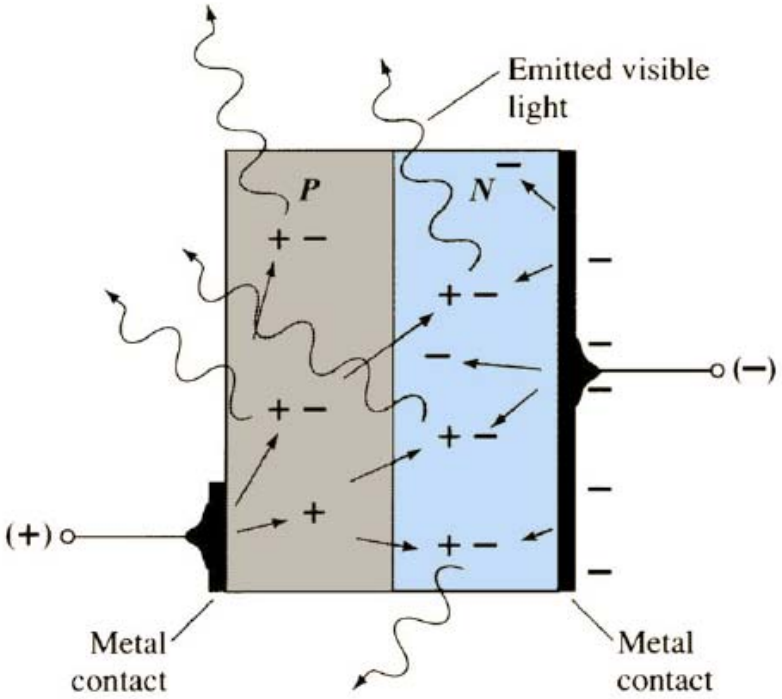
Parte C

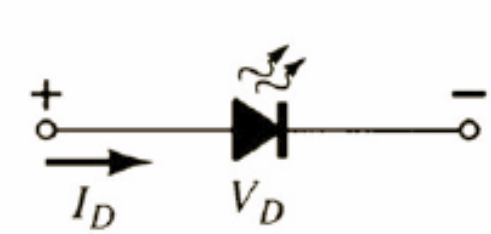
Diodos

LEDs

Diodos emissores de luz (LEDs):

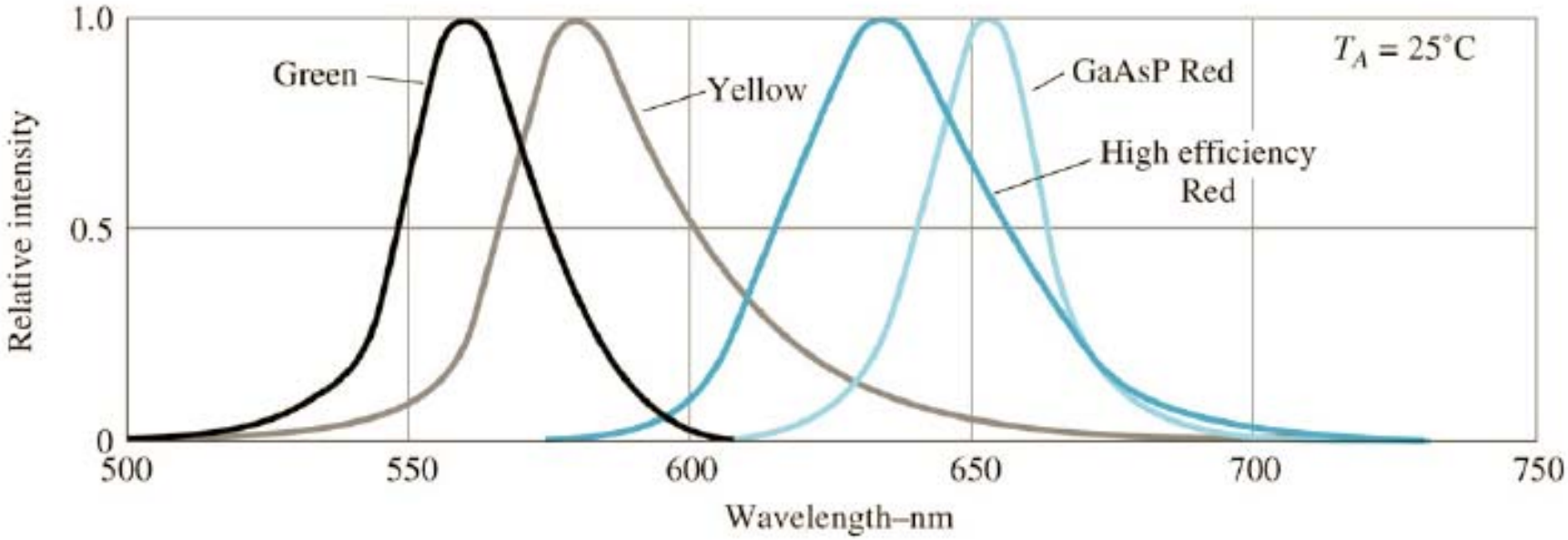
- Eletroluminescência – processo de emissão de luz pela aplicação de uma fonte elétrica de energia.





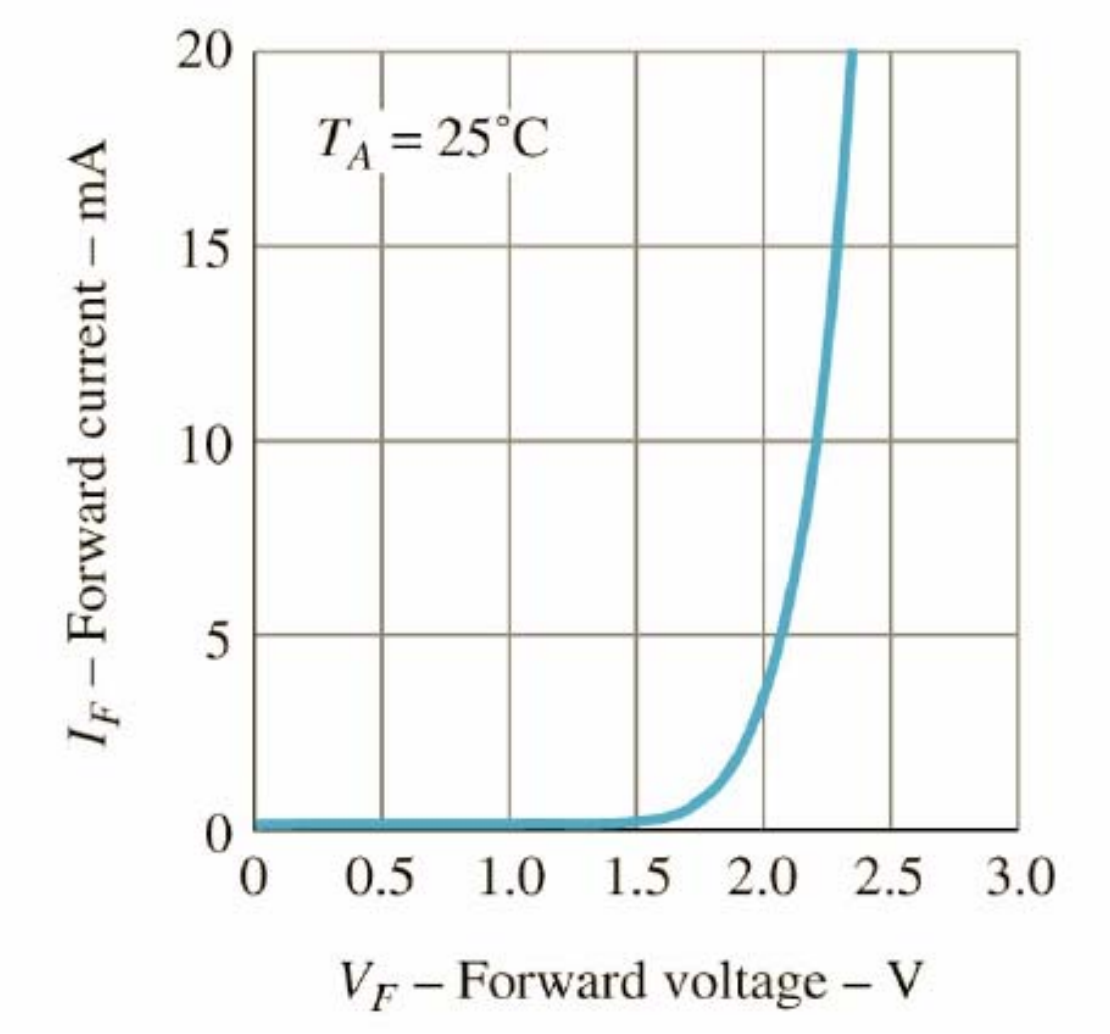
LEDs

Comprimentos de onda dos leds:



LEDs

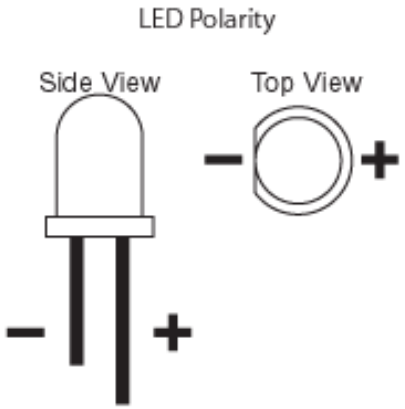
Corrente direta versus tensão direta para leds miniatura:

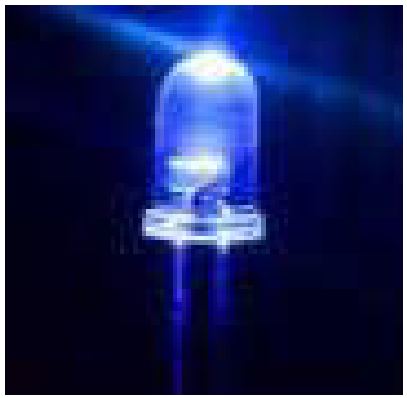


LEDs

Exercícios:

- Dimensionar circuitos com LED conforme especificações de fabricantes.





Spec	Value
Product ID	L4-0-Y5TH30-1
Angle	30
Package	5mm
Color	
Peak Wavelength in nm	590
Luminous Intensity	5000mcd typ. @ 20mA
Max Forward Current	30mA
Max Forward Current Pulse	100mA for <= 10ms, duty <= 1/10
Forward Voltage	2.25V typ. 2.6V max @ 20mA
Max Reverse Voltage	5V
Power Dissipation	
Operating Temp	-30 to +85 C
Soldering Temp	260 C for 5 Sec.
Max Reverse Current	10uA @ 5V

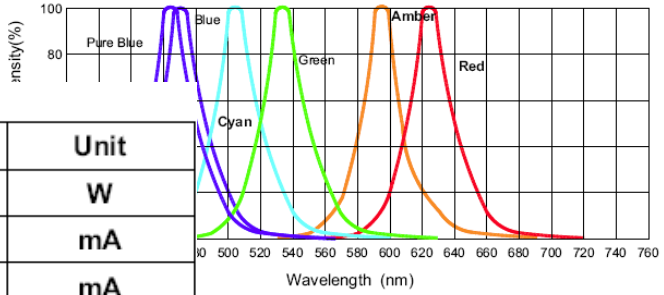
http://www.ledsupply.com

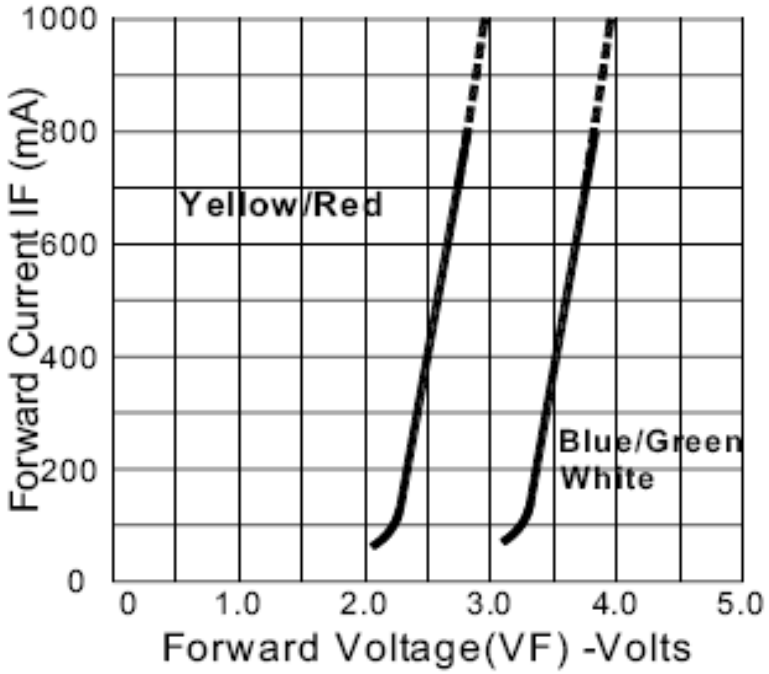
LEDs

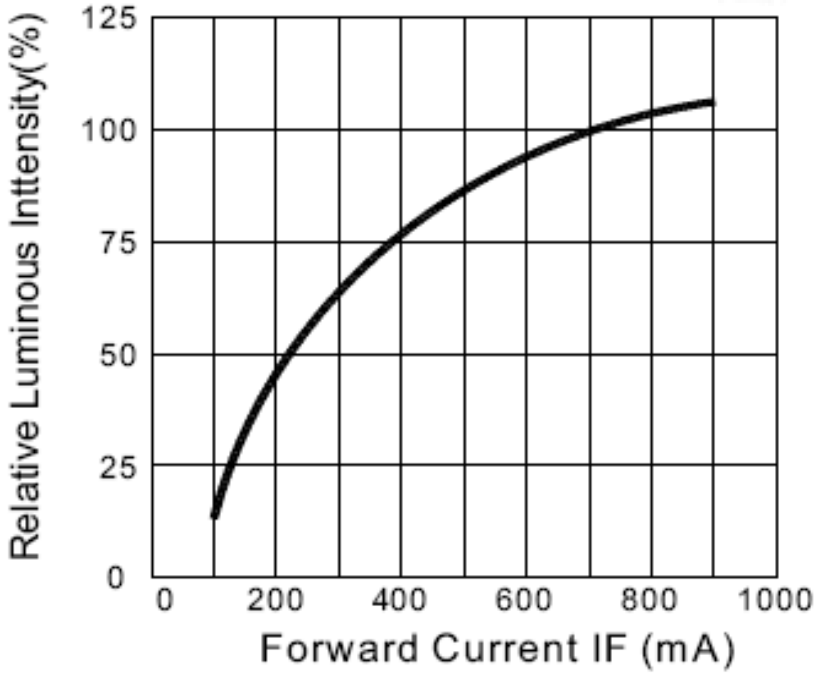
SPECIFICATIONS FOR UPEC POWER LIGHT SOURCE TYPE LED

Absolute Maximum Ratings at Ta=25℃

Parameter	Symbol	Max	Unit
Power Dissipation	PD	3	W
Pulse Forward Current	IPF	1000	mA
Forward Current	IF	700	mA
Reverse Voltage	VR	5	V
Operating Temperature Range	Topr	- 40 to +85	℃
Storage Temperature Range	Tstg	- 40 to + 85	℃







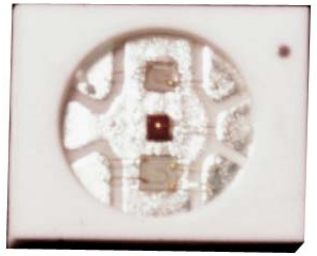
http://www.u-pec.com

LEDs

SPECIFICATIONS FOR UPEC LTCC LIGHT SOURCE LED

MAXIMUM RATINGS

Parameter	Symbol	Values			Unit
		Red	Pure Green	Blue	
Operating temperature range	Top	-40 … + 85			℃
Storage temperature range	Tstg	-40 … +100			℃
Power dissipation (Max)	Pd	2			W
Pulse forward current per chip	Ipf	250	300	250	mA
Forward current (R,G,B)	If	150	200	150	mA
Test current (White mixed)	If	100	200	50	mA
Reverse voltage	Vr	5			V



CHARACTERISTICS (T_J = 25 ℃)

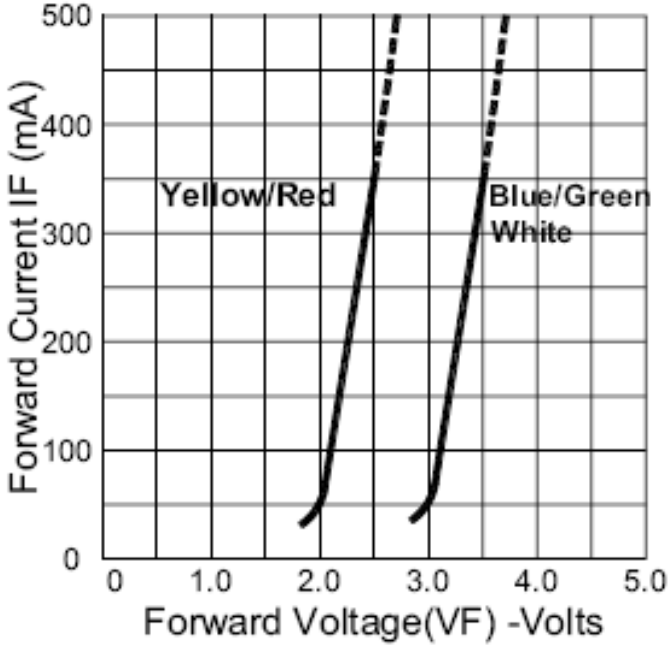
Parameter	Symbol	Values			Unit
		Red	Pure Green	Blue	
Dominant wavelength	λ_{dom}	620~630	520~530	455~465	nm
Spectral bandwidth at 50 % (Typ)	△λ	20	30	20	nm
Viewing angle at 50% Iv	$2\theta_{1/2}$	120	120	120	deg.
Forward voltage	Vf	2.0 3.0	2.8 3.6	2.8 3.6	V
Reverse current	Ir	100			μA

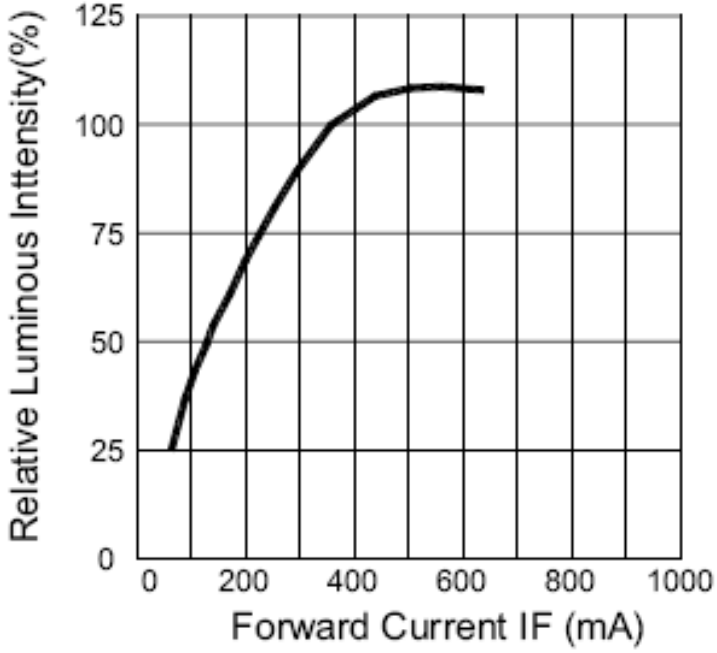
LEDs

SPECIFICATIONS FOR UPEC LED LIGHT SOURCE TYPE SYSTEM

Absolute Maximum Ratings at Ta=25℃

Parameter	Symbol	Max	Unit
Power Dissipation	PD	6	W
Pulse Forward Current	IPF	500	mA
Forward Current	IF	350	mA
Operating Temperature Range	Topr	- 40 to + 120	℃
Storage Temperature Range	Tstg	- 40 to + 120	℃

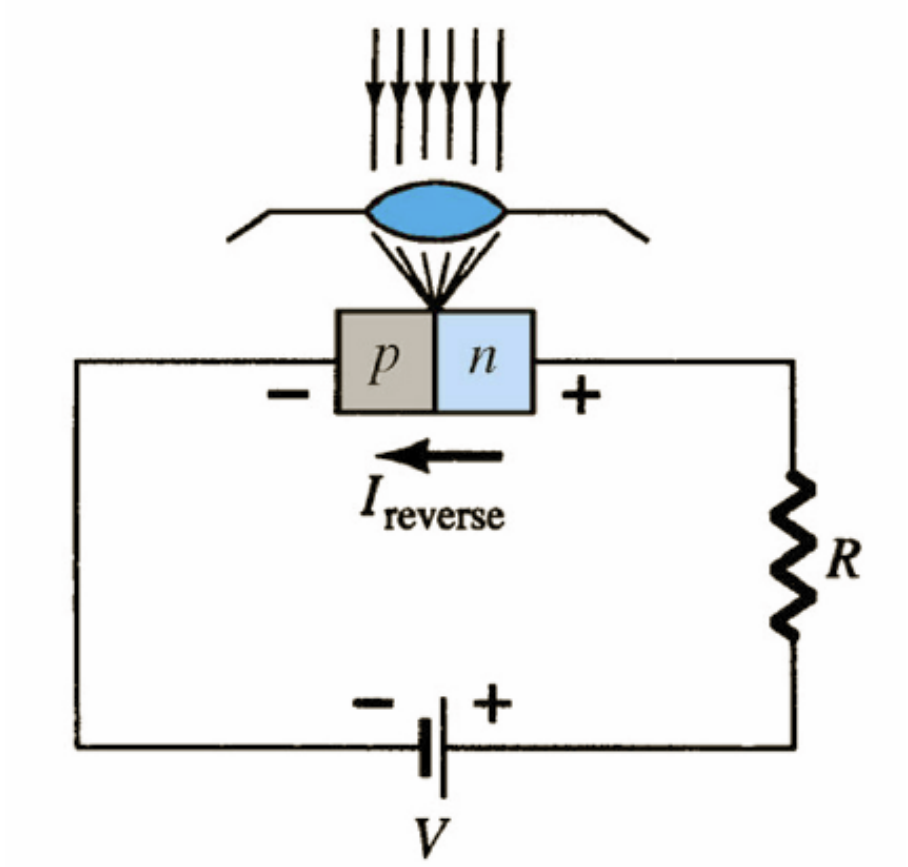


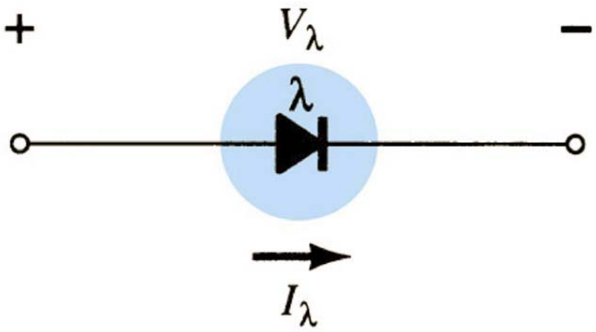


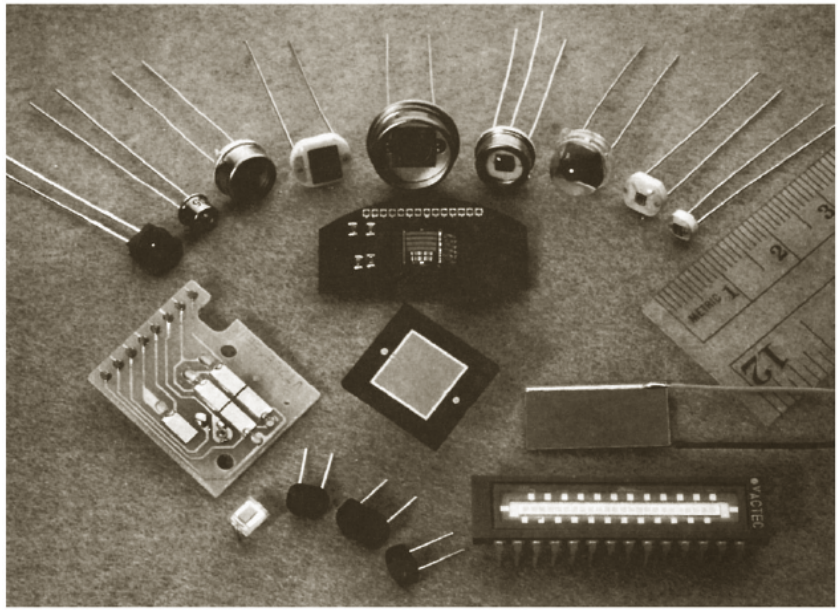
Fotodiodos

Fotodiodos:

- São diodos que operam na região reversa e são sensíveis à luz.
- Optoeletrônica – campo de estudo dos dispositivos sensíveis à luz.

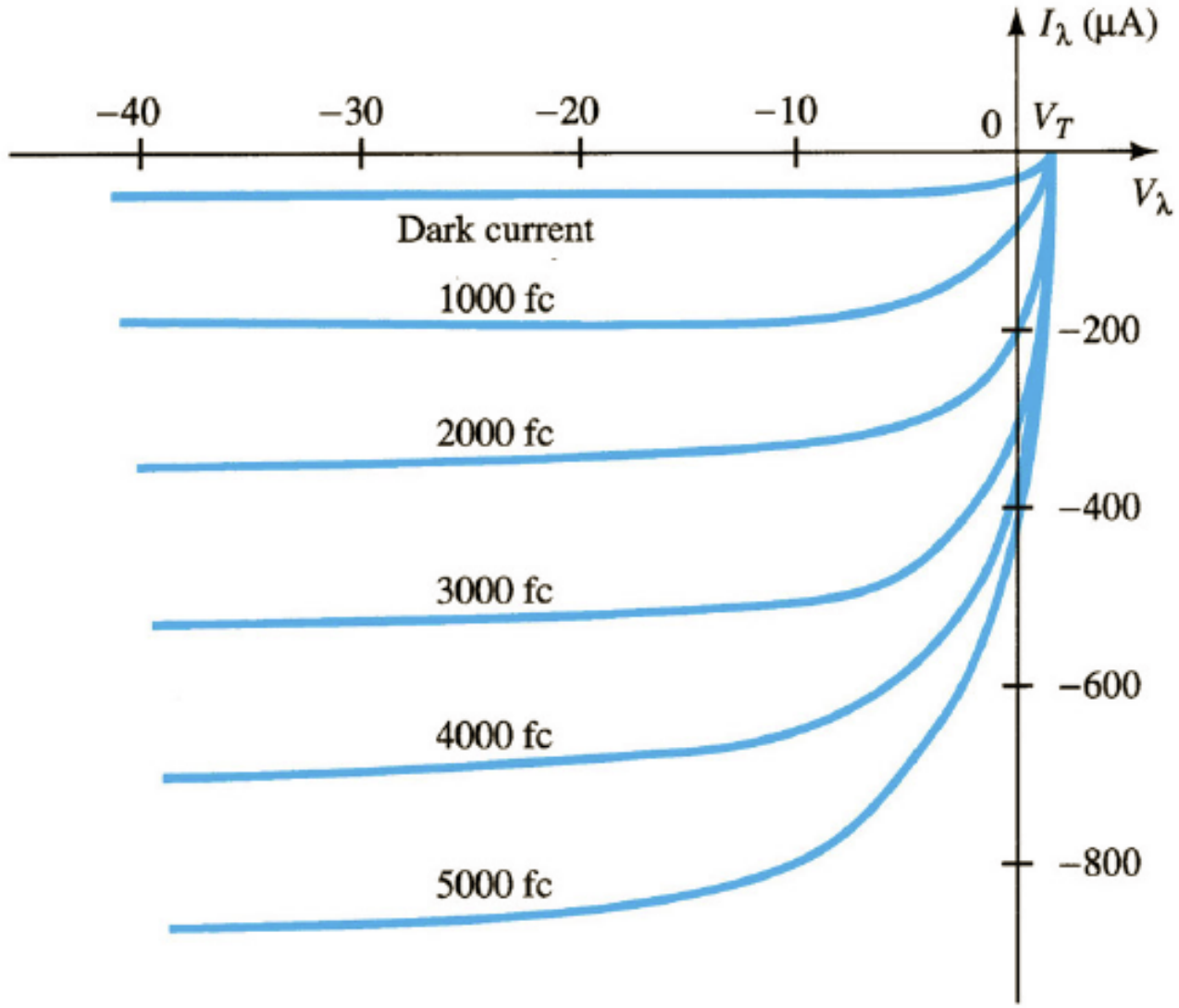






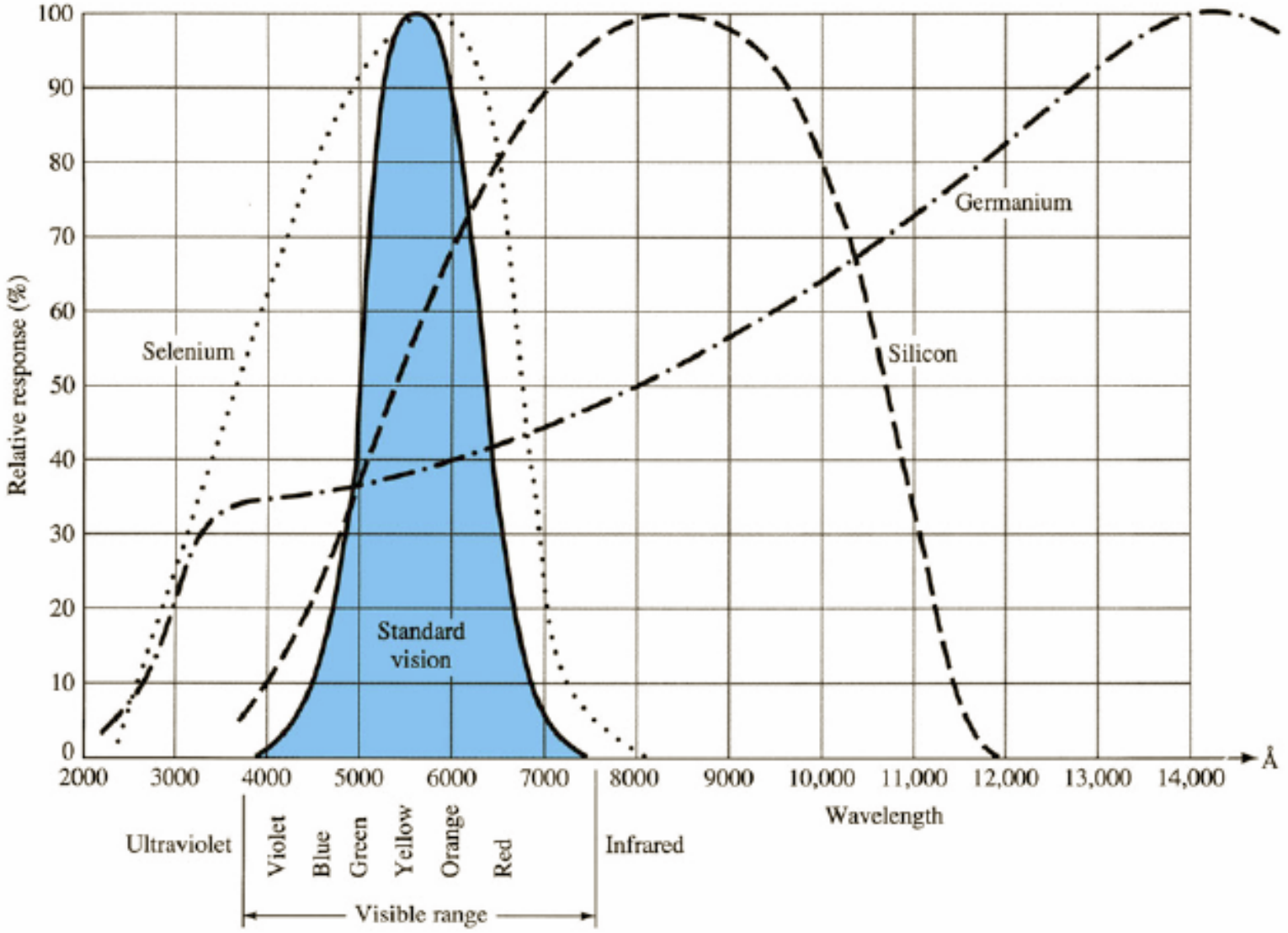
Fotodiodos

Curvas características dos fotodiodos:



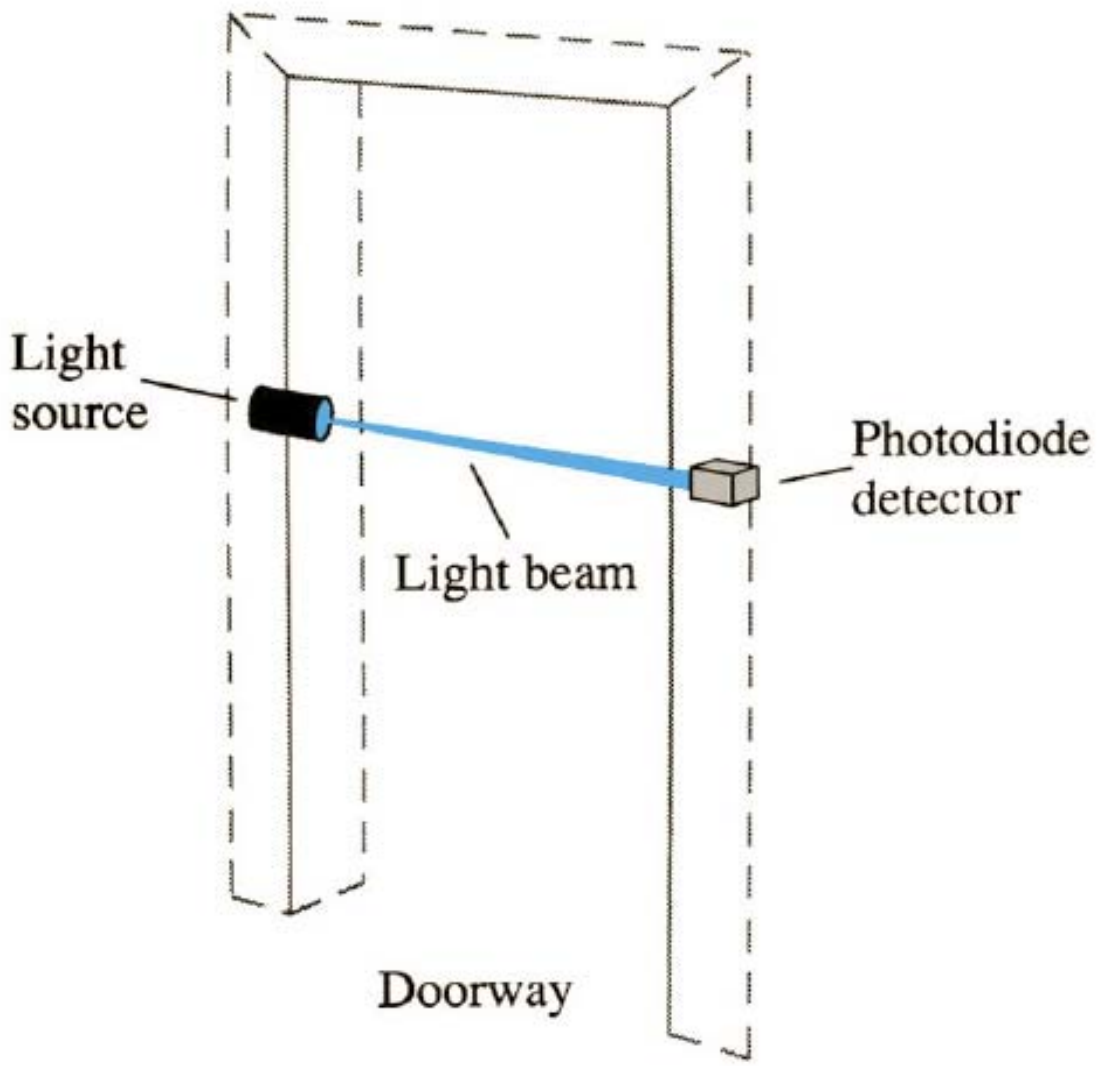
Fotodiodos

Resposta espectral de fotodiodos:



Fotodiodos

Exemplo de aplicação:



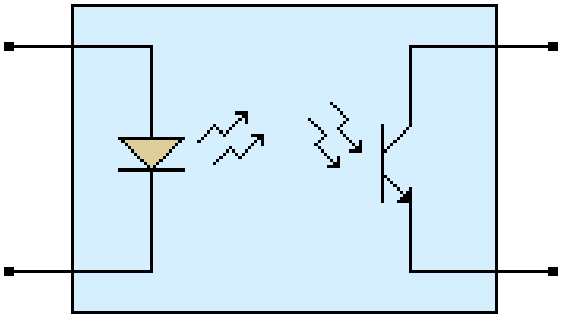
Parte D

Transistores

Fototransistor

Fototransistor:

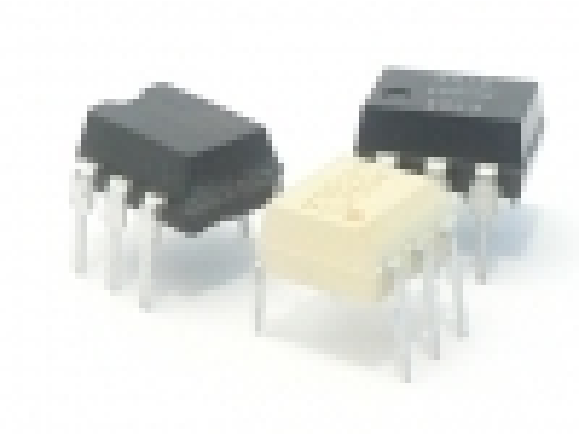
- São transistores sensíveis à luz.

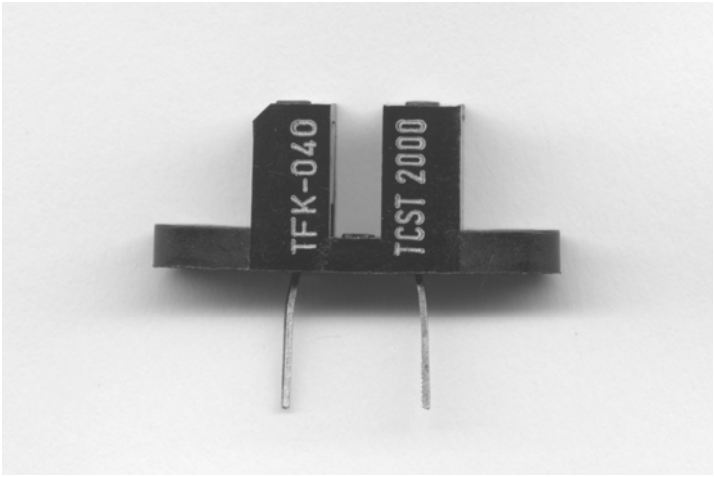


Optoacopladores

Optoacoplador:

- São dispositivos que possuem no mesmo encapsulamento um fotodiodo e um fototransistor (ou tiristor), montados de maneira a permitirem o acoplamento óptico entre os dois.
- Usados para isolação entre circuitos, pois não ocorre ligação elétrica entre os circuitos, por exemplo para transmissão de dados.





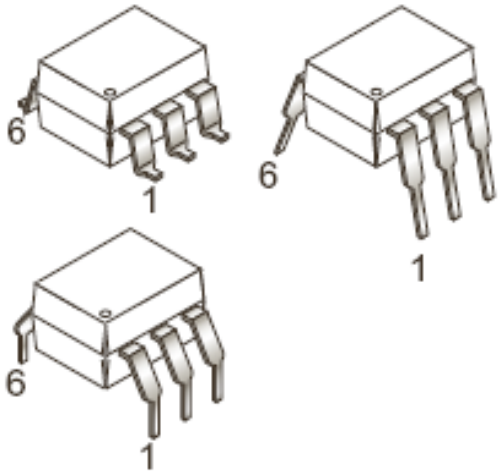
Optoacopladores

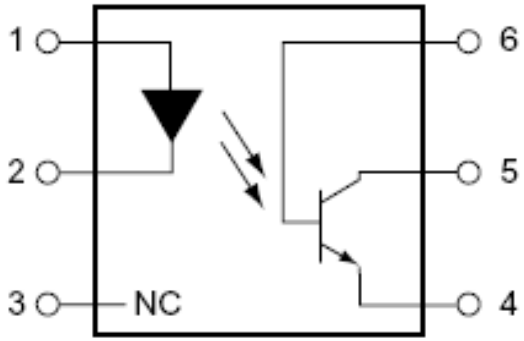
FAIRCHILD SEMICONDUCTOR®

March 2007

4N25M, 4N26M, 4N27M, 4N28M, 4N35M, 4N36M, 4N37M, H11A1M, H11A2M, H11A3M, H11A4M, H11A5M

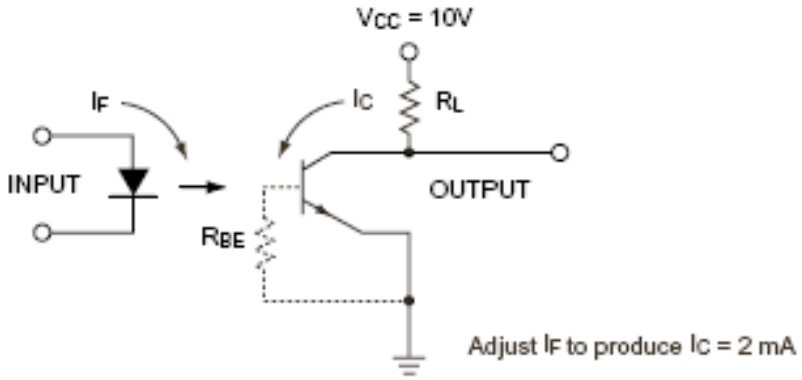
General Purpose 6-Pin Phototransistor Optocouplers





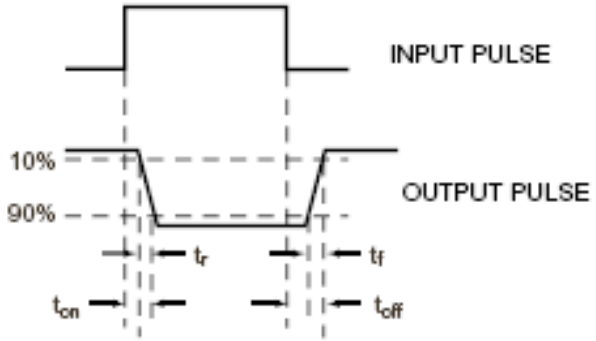
PIN 1. ANODE
2. CATHODE
3. NO CONNECTION
4. EMITTER
5. COLLECTOR
6. BASE

TEST CIRCUIT



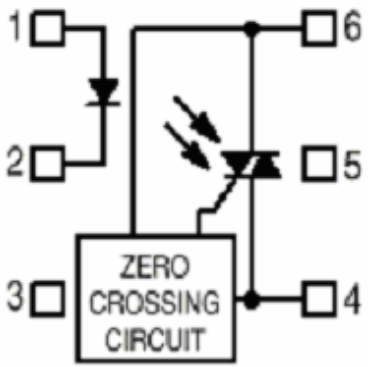
Adjust I_F to produce I_C = 2 mA

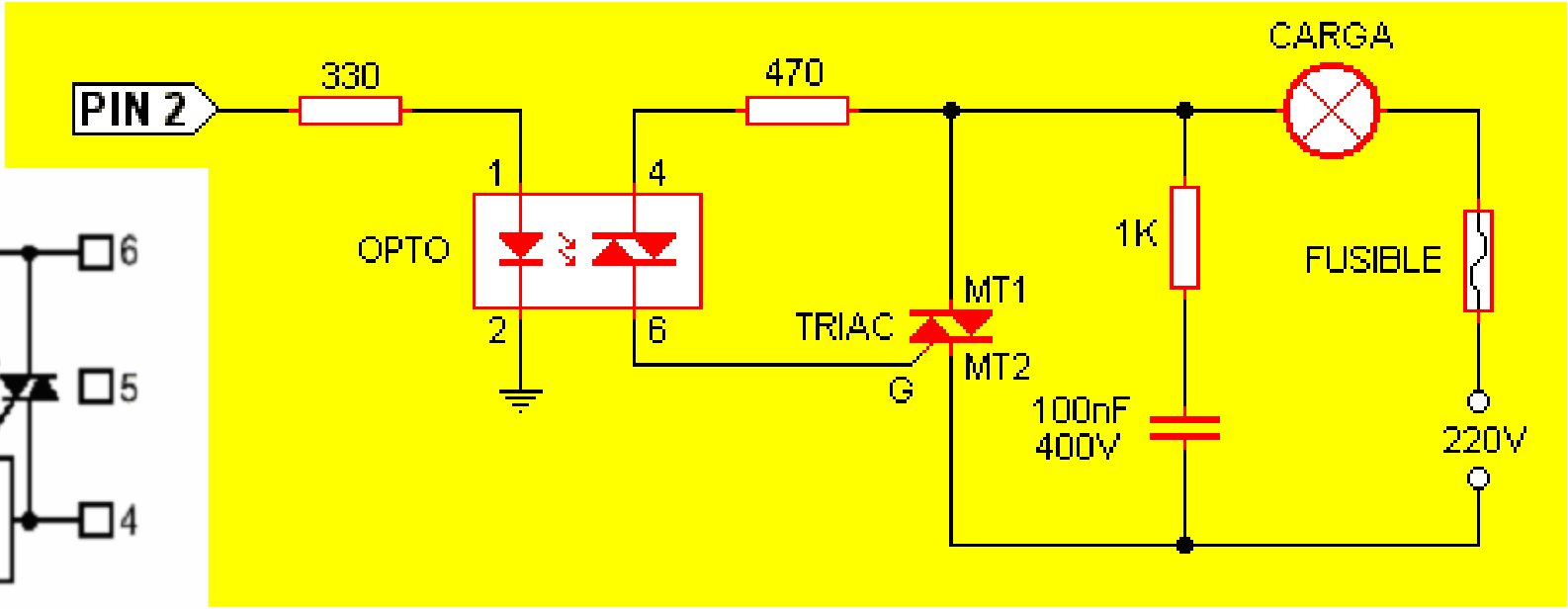
WAVE FORMS



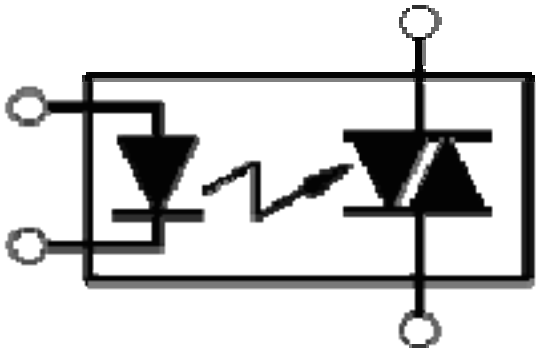
Optoacopladores

Optoacoplador com saída tiristorizada:





1. ANODE
2. CATHODE
3. NC
4. MAIN TERMINAL
5. SUBSTRATE
   DO NOT CONNECT
6. MAIN TERMINAL

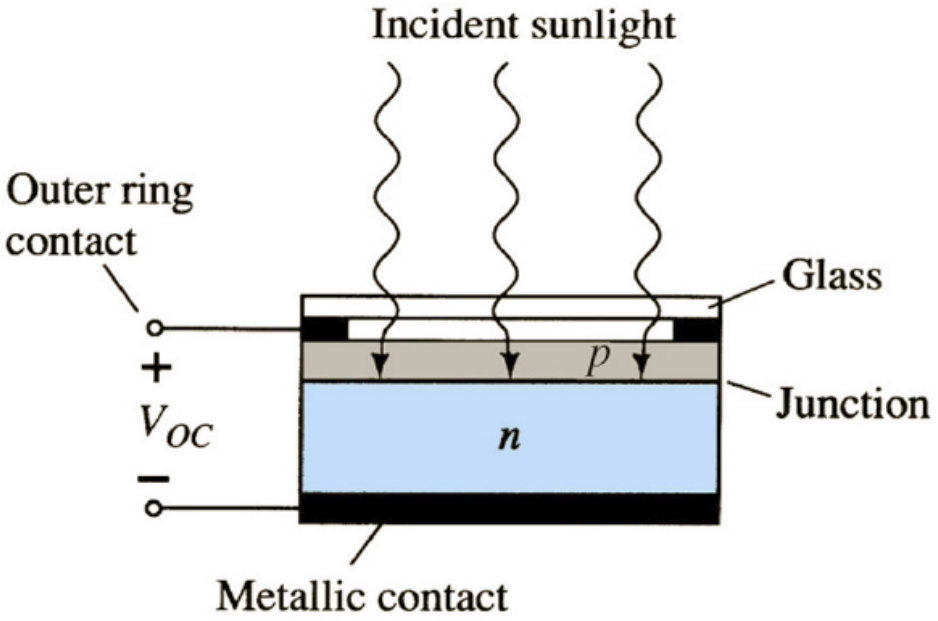


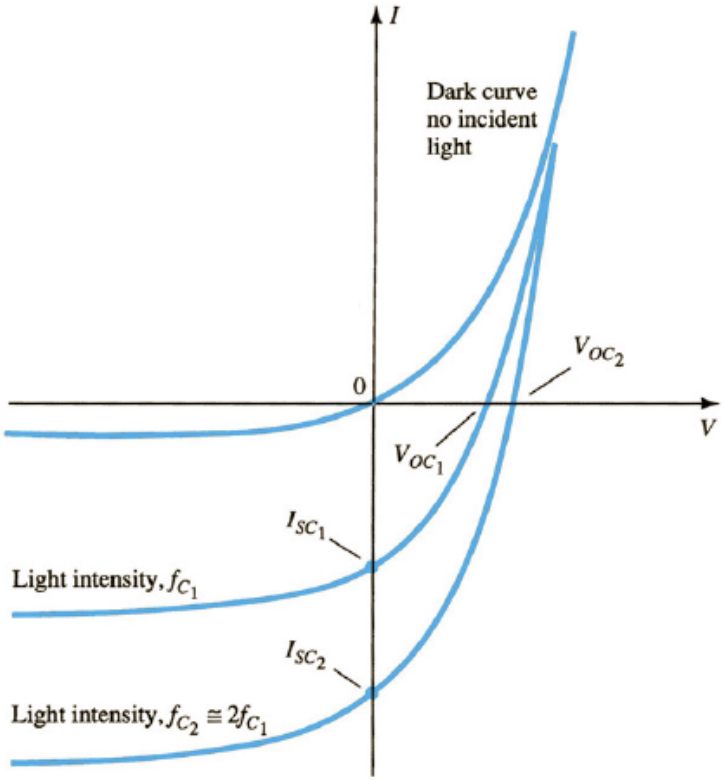
Células solares

Células solares

Células solares:

- São dispositivos construídos a partir de materiais semicondutores e que são sensíveis à luz.
- Geram potências da ordem de mW quando iluminados.





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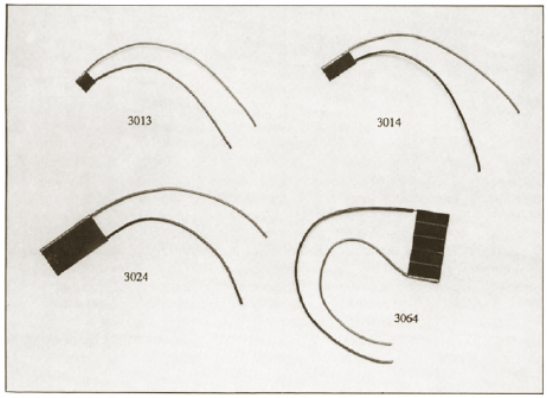

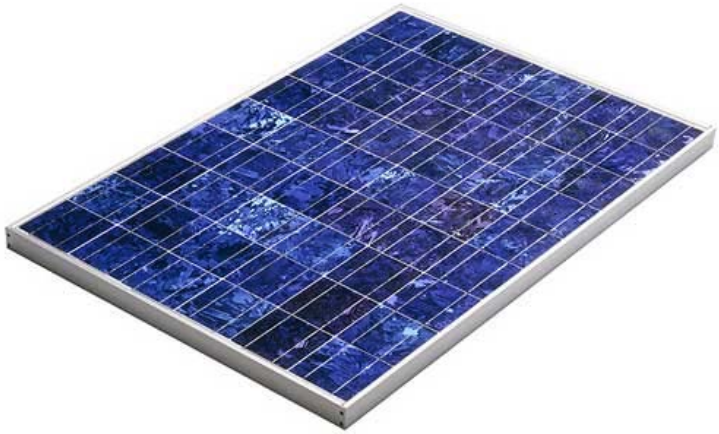

Na próxima aula

Seqüência de conteúdos:

1. Aplicações dos diodos.