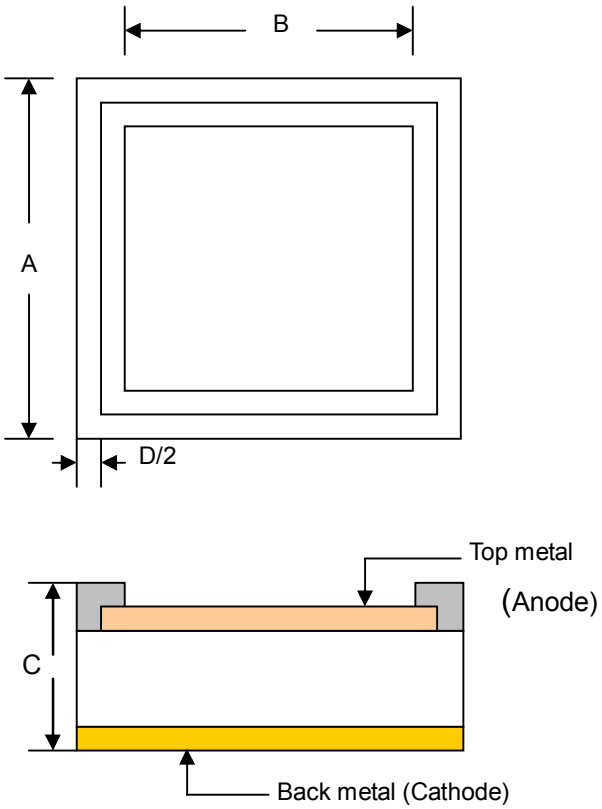
CRD Current Regulative Diode

CRD can provide with a constant current, under a wide range of voltage fluctuations, to LED or other electronics devices especially in LED lighting applications, which makes it more efficient，cost- effective and simpler in power design.



Item	Dimensions	
	um	mil
Die Size（A）	820	32.3
Top Metal (Al)	550	21.6
Top Metal Pad size（B）		
Top Metal (Ag)	510	20
Top Metal Pad size（B）		
Wafer Thickness（C）	260	10.2
Scribe Line Width（D）	60	2.36
Other Information		
Wafer Size	6”	
Gross Die	24000	
Back Side Metal	Ag	

Characteristics

Working Voltage Range：3V~190V
LOW Active Voltage
Negative Temperature Coefficient

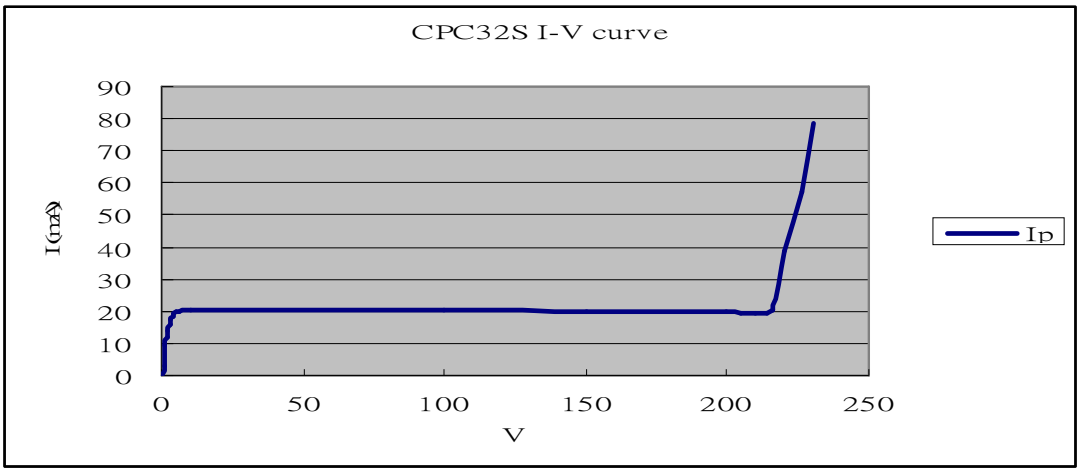
Applications

The purpose of CRD constant current is to support and stabilize LED illumination in lighting power，which is an advantage alternative way to switching mode design. This application has been widely applied to LED power such as LED tube lighting，LED street light，LED bulbs, etc.

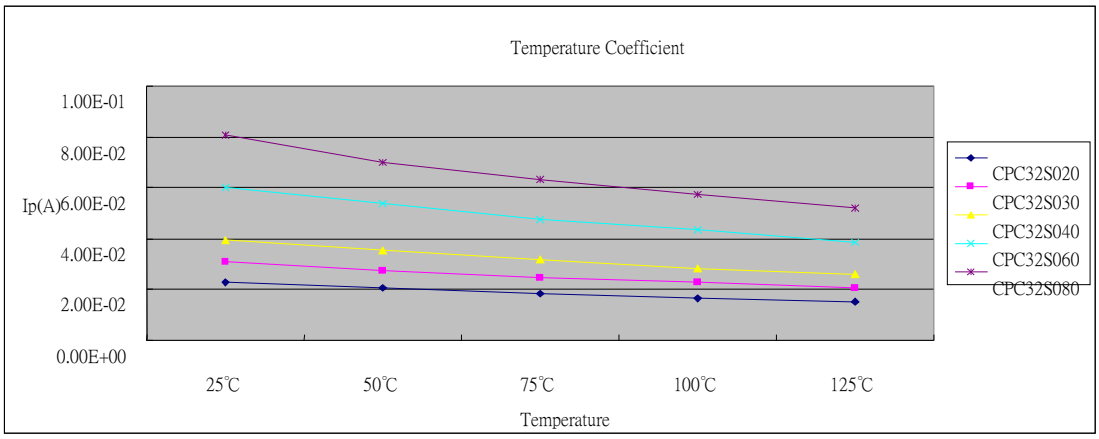
Specifications (Electrical Characteristics @TA=25°C)

Wafer Part No.	Pinch-Off Current I_P @ V=20V		Active Voltage V_K	Max. Voltage Loading V_B max	Max. Power Loading P_D	Junction & Storage Temp. T_J , T_{stg}	Top Metal
	min	max	V_K @ 0.8I_{Pmin}	V_B@1.1I_{Pmax}	max	Range	
	[mA]	[mA]	Max [V]	[V]	[w]	[℃]	
CPC32S015HG	12	18	3.2	190	1.2	-55~150	Ag
CPC32S015HL	12	18	3.2	190	1.2	-55~150	Al
CPC32S020HG	16	24	3.5	190	1.2	-55~150	Ag
CPC32S020HL	16	24	3.5	190	1.2	-55~150	Al
CPC32S025HG	22.5	27.5	4.0	190	1.2	-55~150	Ag
CPC32S025HL	22.5	27.5	4.0	190	1.2	-55~150	Al
CPC32S030HG	27	33	4.8	190	1.2	-55~150	Ag
CPC32S030HL	27	33	4.8	190	1.2	-55~150	Al
CPC32S040HG	36	44	6.0	190	1.2	-55~150	Ag
CPC32S040HL	36	44	6.0	190	1.2	-55~150	Al
CPC32S060HG	54	66	7.0	190	1.2	-55~150	Ag
CPC32S060HL	54	66	7.0	190	1.2	-55~150	Al
CPC32S080HG	72	88	8.0	190	1.2	-55~150	Ag
CPC32S080HL	72	88	8.0	190	1.2	-55~150	Al

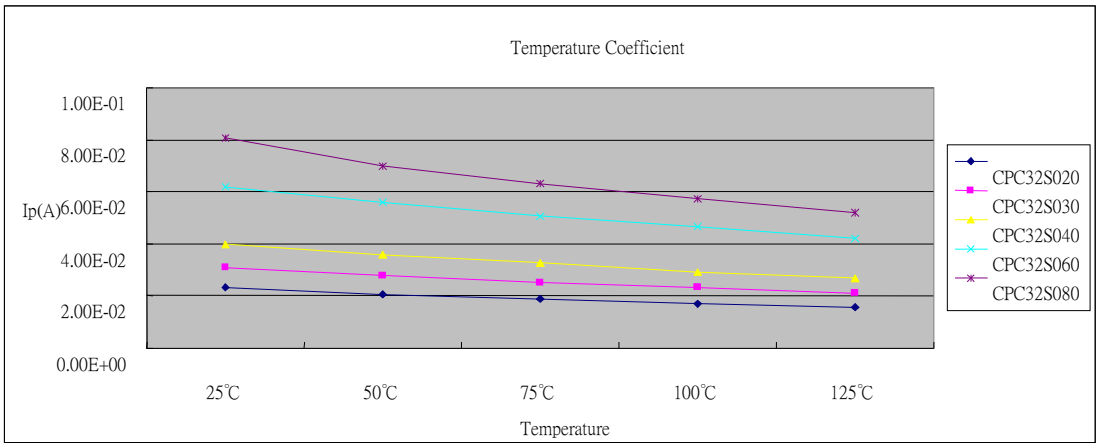
I-V Curve @TA=25°C



Temperature Coefficient Curve (V=10V)



Temperature Coefficient Curve (V=20V)



LED lighting application rules

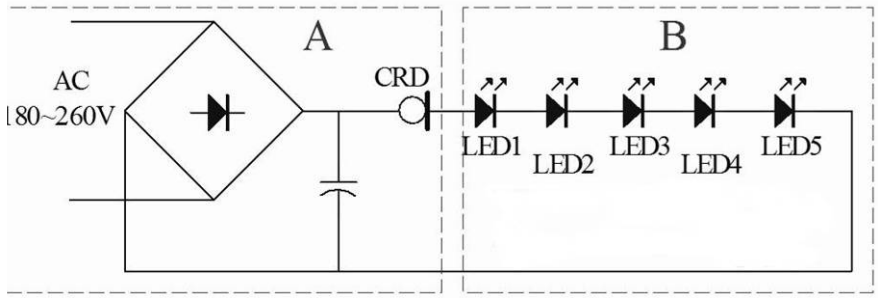
(1) CRD max. loading voltage = peak input voltage (AC voltage x 1.414) – LED total series connection working voltage (VfxN). This value must be lower than the listed Max. Voltage Loading.

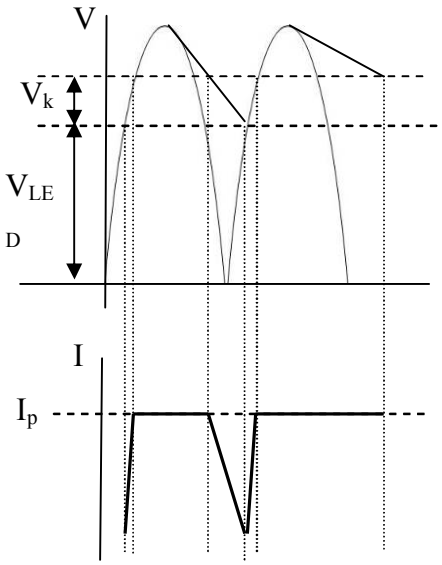
(2) The max. no. of LED series connection = (peak input voltage (AC voltage x 1.414) –CRD Active Voltage V_k) / LED working voltage Vf。

(3) The min. no. of LED series connection = (peak input voltage (AC voltage x 1.414) –CRD Max. Loading Voltage V_{Bmax}) / LED working voltage Vf。

(4) Max CRD Power Loading = CRD Max. Voltage Loading x CRD current loading. This value must be lower than the listed Max. Power Loading.

LED Circuit Design Sample A



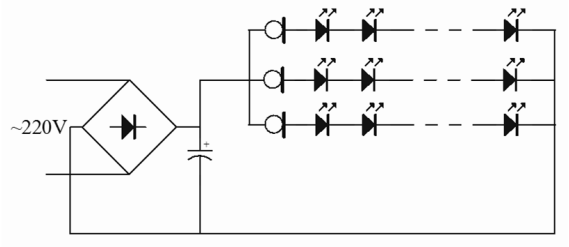


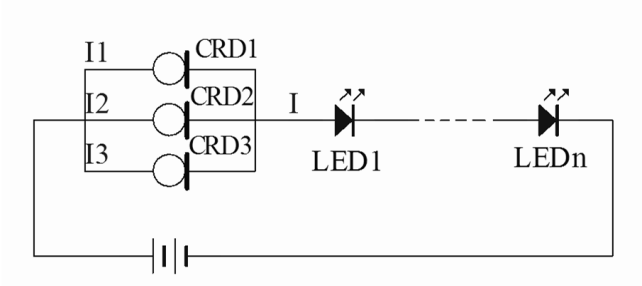
AC Voltage 220V
LED Vf 55V (N=5)

The design shows if the device CPC32S020HG is adapted in this application,
(1) CRD Max. Loading Voltage = (220V x 1.414) – (55V x 5) = 36V; and
(2) CRD Max. Power Loading = 20mA x 36V = 0.72W

LED Circuit Design Sample B

CRD in parallel connection is commonly used to satisfy various current requirement and effectively lower CRD voltage loading, shown as below diagram.



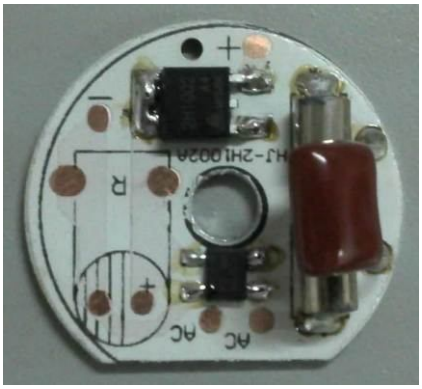


Practical Application Case A

5 high-voltage LED's in series connection and CRD application


Practical Application Case B

4 high-voltage LED's in series connection and CRD application

Simple CRD Design Rule reminding：

(1) The max. loading of CRD circuit design should not exceed listed loading limitation to ensure safety concern in application. When designed max. power loading exceeds allowed standard, serious damages could be caused to CRD's.

(2) When T_A goes up, the Vf of LED will drop and simultaneously lead to higher LED voltage loading; consequently, practical reliability tests and essential design modifications are highly recommended to ensure safety issues, before any designed circuits are prepared for mass production.