

## Single Channel Constant Current Regulator

### Features

- The most easy used linear constant current LED driver
- Strong bond pad design
- $V_{DD}$  7~60V supply voltage
- 60V output breakdown voltage
- 5~200mA constant current regulator
- Less than -0.05%/V line/load regulation
- $I_{PN} \leq 20\text{mA}$  65~85 °C junction temperature current ramp down thermal protect
- $I_{PN} \geq 150\text{mA}$  135~165 °C junction temperature current ramp down thermal protect
- -40~110°C operating temperature

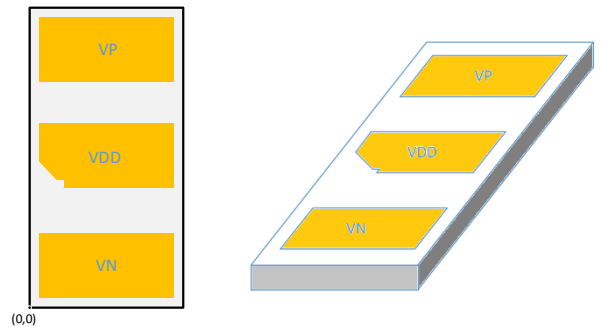
### Applications

- Constant current LED (CCLED)
- Constant current COB light engine

### Dice information

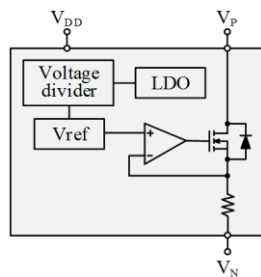
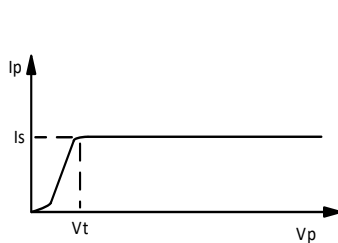
Chip Size:  $x*y = 425\mu\text{m} * 745\mu\text{m}$

Coordinate	X	Y	Pad size
VP	213	645	379 * 152
VDD	213	371	
VN	213	96	



### Block Diagram and Ideal IV characteristic

IV curve



### Ordering information

Part number: NU520-XXXX

Example:

NU520-150W: 150mA type W for wire bound application  
 NU520-150G: 150mA type G for flip chip application

- PS.1. NU520 type G is designed for flip chip application and can't be used for wire bound application, vice-versa for W type.
2. Before you issue your P.O., please contact your agent or NUMEN technology to make sure the type of output current is available. Numen will irregular update the new current type.
  3. Output current now available:  
20mA, 150mA, 200mA

### Maximum Ratings (T = 25°C)

Characteristic	Symbol	Rating	Unit
Output breakdown voltage (Output off)	$V_{PN}$	-0.2 ~ 60	V
$V_{DD}$ supply voltage	$V_{DD}$	-0.2 ~ 80	V
Operating temperature	$T_{OPR}$	-40~+110	°C
Storage temperature	$T_{STG}$	-55~+150	°C

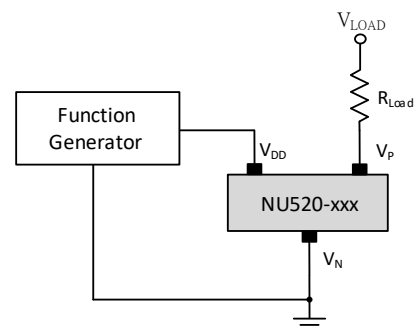
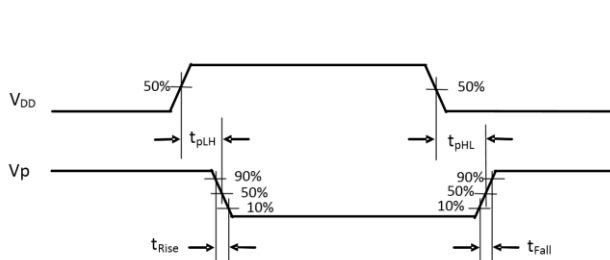
**Electrical Characteristics and Recommended Operating Conditions**

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit	
Max. working voltage	V <sub>PNmax</sub>	I <sub>PN</sub> = I <sub>S</sub>	Continuous	-	-	30	V
			Short time	-	-	60	V
Supply voltage	V <sub>DD</sub>	I <sub>PN</sub> = I <sub>S</sub>	I <sub>PN</sub> ≥ 150mA	7	-	60	V
			I <sub>PN</sub> ≤ 20mA	3.5	-	60	
Supply current	I <sub>DD</sub>	7V ≤ V <sub>DD</sub> ≤ 40V		-	0.16	0.22	mA
		40V < V <sub>DD</sub> ≤ 60V		-	-	2.2	
Minimum dropout voltage	V <sub>PN</sub>	V <sub>DD</sub> > 7V	I <sub>PN</sub> = 200mA	-	1	-	V
			I <sub>PN</sub> = 150mA	-	0.8	-	
			I <sub>PN</sub> = 20mA	-	0.3	-	
Output current	I <sub>S</sub>	Spec.	-	10~200	-	mA	
Output current skew	I <sub>skew</sub>	I <sub>S</sub>	-	2	3.5	%	
Thermal regulation	%/100°C	Output enabled, Junction temp. < 130°C	-	-2.5	-	%	
Output ramp down temperature	T <sub>1</sub>	I <sub>PN</sub> ≤ 20mA	Output enabled	-	65	-	°C
		I <sub>PN</sub> ≥ 150mA		-	140		
Shutdown temperature	T <sub>2</sub>	I <sub>PN</sub> ≤ 20mA	I <sub>OPT</sub> < 0.1*I <sub>S</sub>	-	85	-	°C
		I <sub>PN</sub> ≥ 150mA		-	170		
Line/Load regulation	%/V <sub>P</sub>	60V > V <sub>PN</sub> > 1.5V	-	-	-0.05	%/V	

**Switching Characteristics (T = 25°C)**

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Propagation Delay Time V <sub>DD</sub> from "L" to "H"	t <sub>pLH</sub>	V <sub>PN</sub> =1.5V, V <sub>DD</sub> = 0V → 7V	-	1.3	-	us
Output current rising time	t <sub>rise</sub>	V <sub>PN</sub> = 1.5V, V <sub>DD</sub> = 0V → 7V	-	9	-	
Propagation Delay Time V <sub>DD</sub> from "H" to "L"	t <sub>pHL</sub>	V <sub>PN</sub> =1.5V, V <sub>DD</sub> = 7V → 0V	-	100	-	ns
Output current falling time	t <sub>fall</sub>	V <sub>PN</sub> = 1.5V, V <sub>DD</sub> = 7V → 0V	-	150	-	

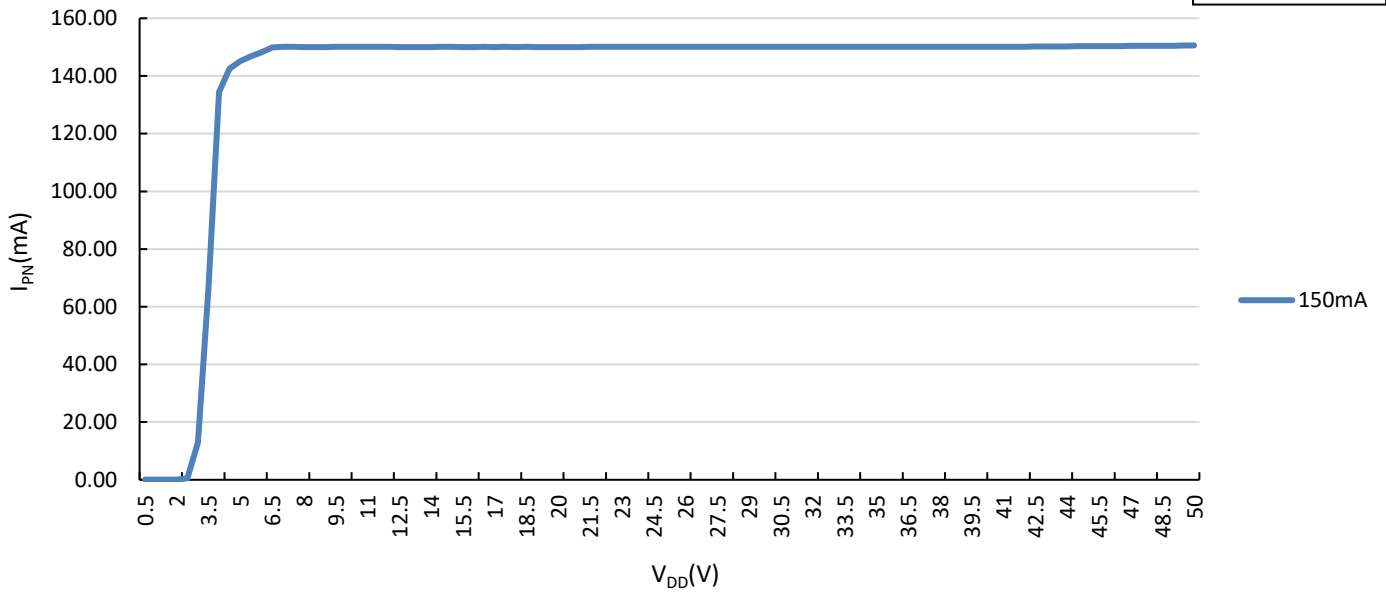
**Timing Waveform**



**I/V curve**

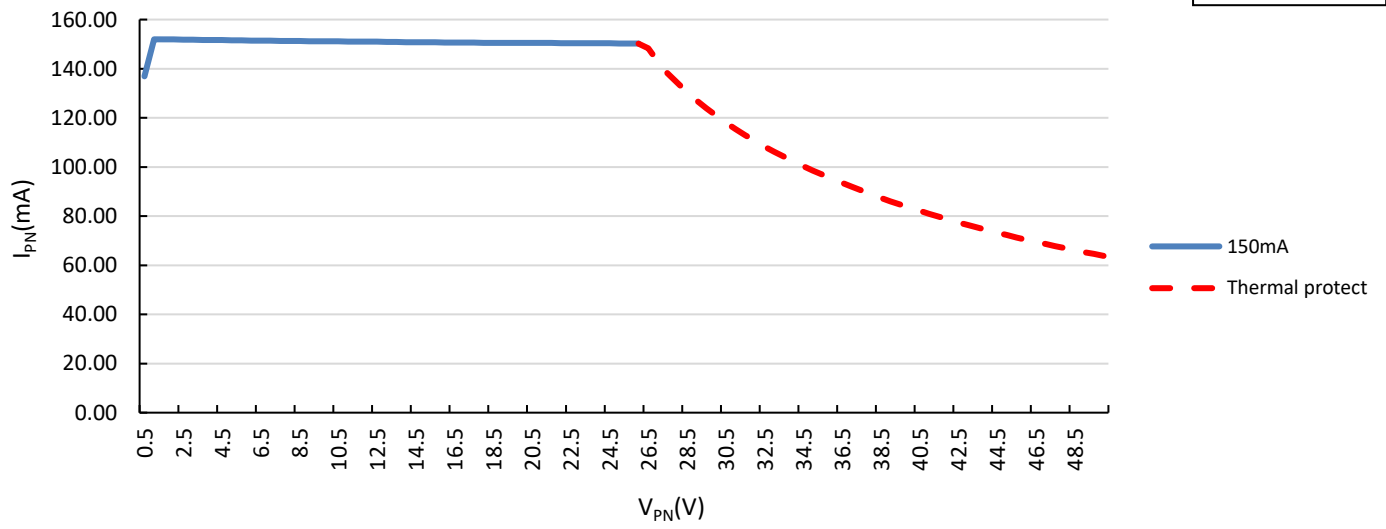
Line regulation

$V_{PN} = 1.5V$



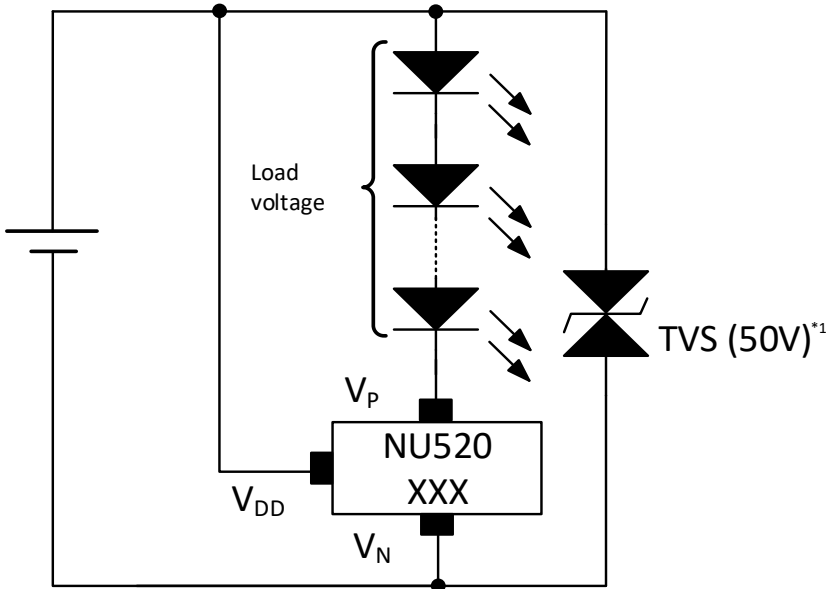
Load regulation

$V_{DD} = 7V$

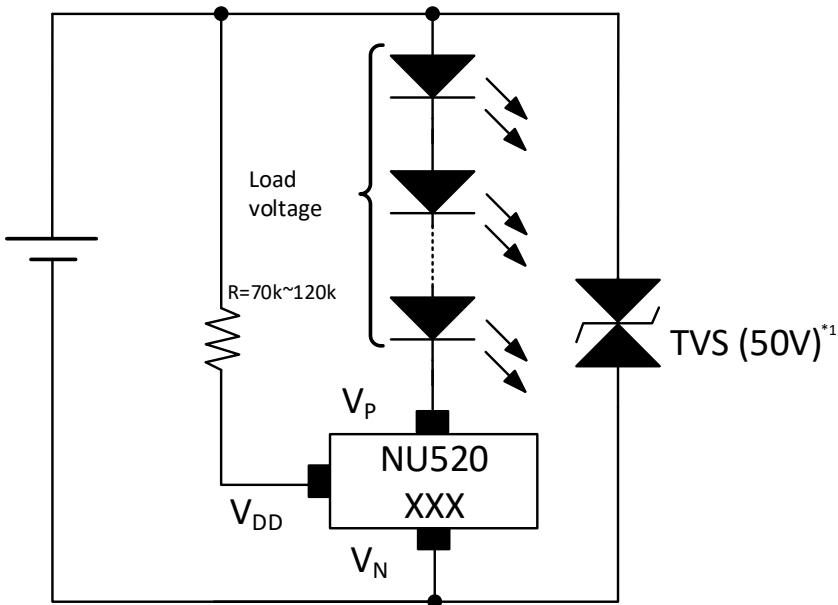


**Application Circuits**

- DC power general lighting < 20V



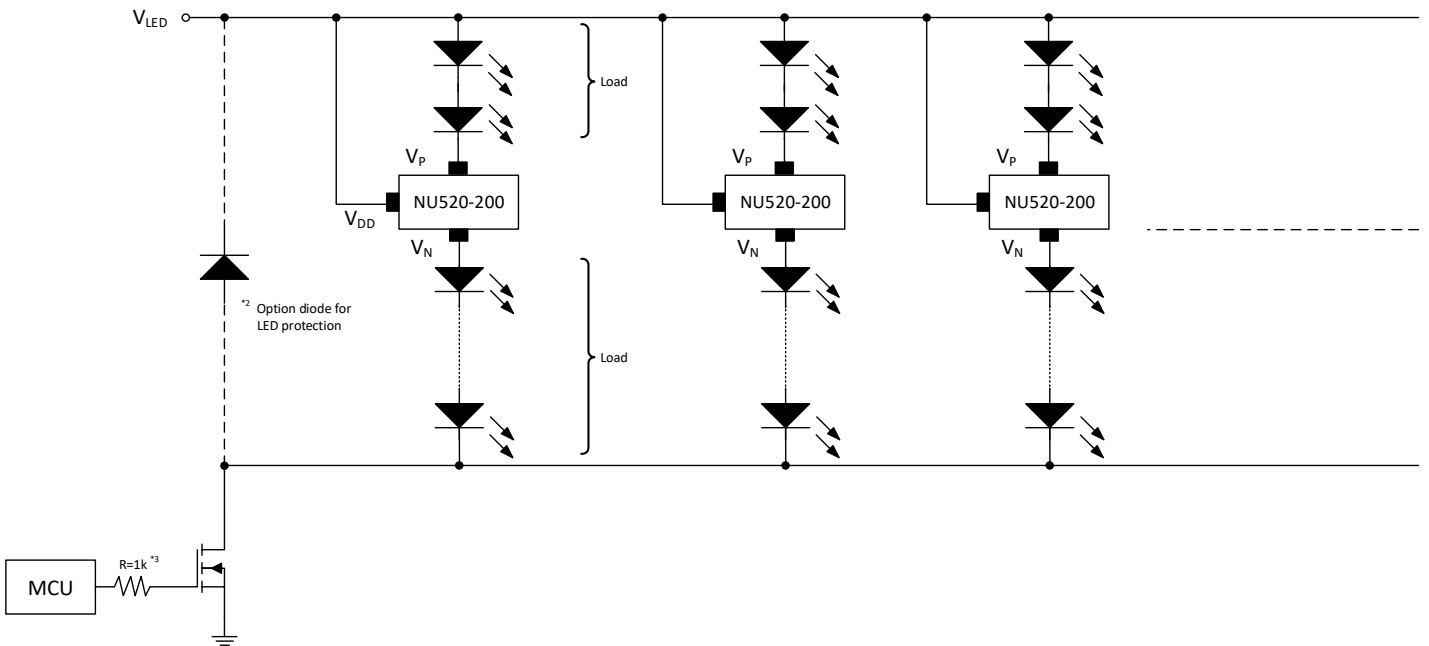
- DC power general lighting  $\geq 20V$



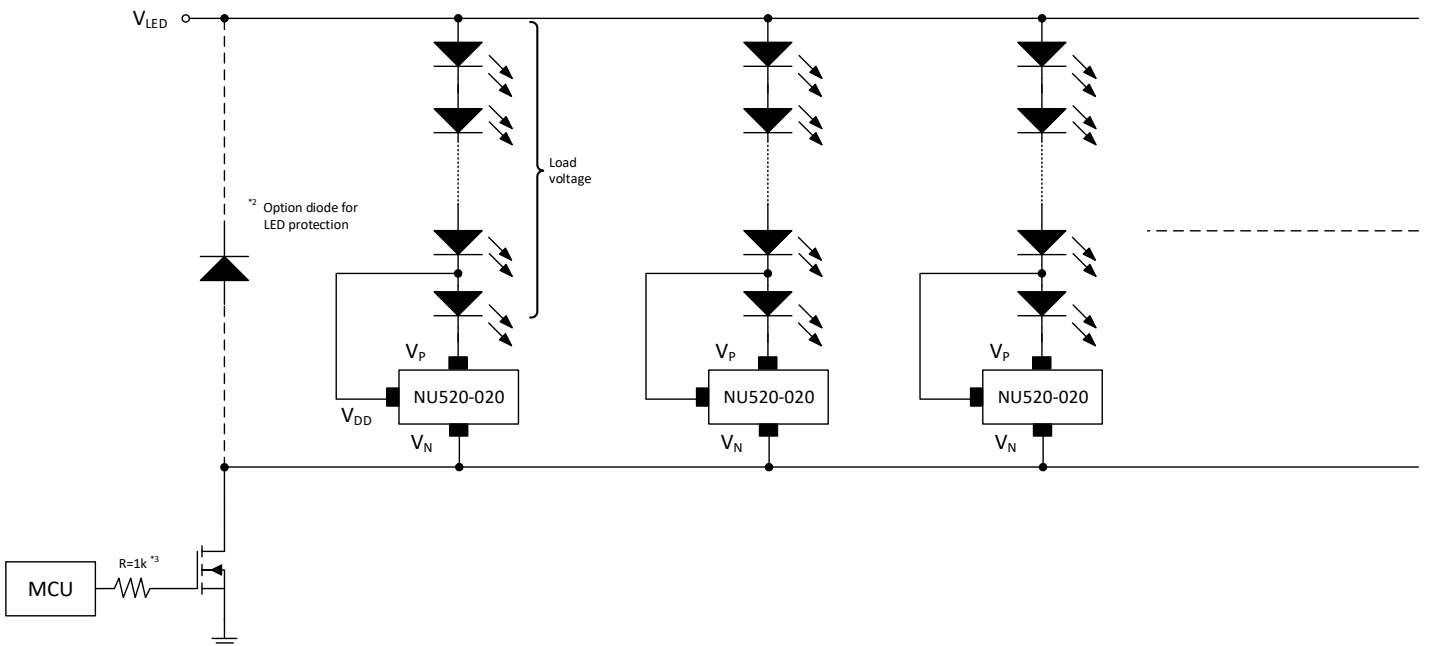
\*1: In vehicle or some environment that power supply may have high voltage induced, TVS is recommended to be used.

● LED strip dimming application

Example 1:



Example 2:



\*2: LED protection diode for high speed dimming. Suggest to add one protection diode every certain distance.

\*3: Power voltage transition slow down resistor for noise reduction.

## Special Optical Restrictions

The output current of NU520-xxx maybe will drift slightly when NU520-xxx bare die is exposure to the strong light. It would be better if NU520-xxx bare die is covered by non-transparent material or mechanical structure to isolate the light.

## Restrictions on product use

- NUMEN Tech. reserves the right to update these specifications in the future.
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