



九齊科技股份有限公司
Nyquest Technology Co., Ltd.

DATA SHEET

NY1D003B

Low Power Constant Current LED Driver

Version 1.2

Apr. 24, 2017

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Revision History

Version	Date	Description	Modified Page
1.0	2016/02/24	First release.	-
1.1	2016/08/16	Modify P/N.	3, 4, 6
1.2	2017/04/24	Modify pin definition of NY1D003BS3-160.	3, 4

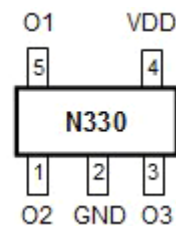
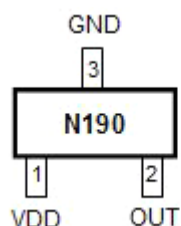
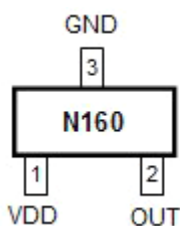
1. 概述

NY1D003B產品為單晶片CMOS的LED驅動IC，它是一個應用非常簡單的線性定電流元件，不需外加任何元器件就可以提供三通道的 20mA 或 30mA 的恆流輸出，或是單通道的 60mA 或 90mA 的恆流輸出。具有絕佳的負載與電源調變率和極小輸出電流誤差，能使 LED 的電流非常穩定，在大面積的光源上，即使電源及負載的變動範圍很大時，都能讓LED亮度保持均勻一致，並增長LED使用壽命。

2. 功能

- (1). 寬廣的工作電壓： $V_{DD} = 1.8V \sim 6.4V$ 。
- (2). 可支援3通道的 20mA 或 30mA 的恆流輸出，或是單通道的 60mA 或 90mA 的恆流輸出。
- (3). 低輸出壓降， $V_{OUT} \geq 0.2V$ 即可保持恆流。
- (4). $\pm 1\%/V$ 的電源及負載調變率。
- (5). ZTC電流補償線路，可在 $-40 \sim +85^{\circ}C$ 溫度範圍內保持電流恆定。
- (6). 提供 $V_{DD} \leq 1.6V$ 的低電壓關閉保護功能 (Under Voltage Lock Out, UVLO)，可以在上電瞬間或電源不穩定時對IC或線路進行保護。
- (7). 每通道都提供輸出短路/開路的線路保護。
- (8). 高達 4KV 的人體靜電模式 (HBM) 的 ESD 保護。
- (9). 提供多種出貨型態，以滿足客戶不同的應用需求。[\(接受客製化輸出電流\)](#)

編號	通道數	LED 電流	封裝
NY1D003BS3-160	1	60mA	SOT23-3
NY1D003BS3-190	1	90mA	SOT23-3
NY1D003BS5-320	3	20mA	SOT23-5
NY1D003BS5-330	3	30mA	SOT23-5



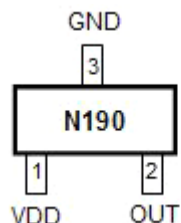
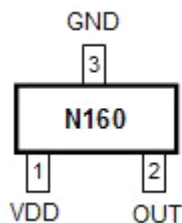
1. GENERAL DESCRIPTION

The NY1D003B is single-chip LED Drive CMOS IC. It is a linear LED driver applied easily without any external component, which can provide 3-channel constant current output with 20mA or 30mA, or 1-channel constant current output with 60mA or 90mA. With excellent load/line regulation and minimized current skew, LED current can be kept very stable. In large range of LED light source, it makes the light intensity very uniform and extends LED lifetime even when power or load fluctuate in a wide range.

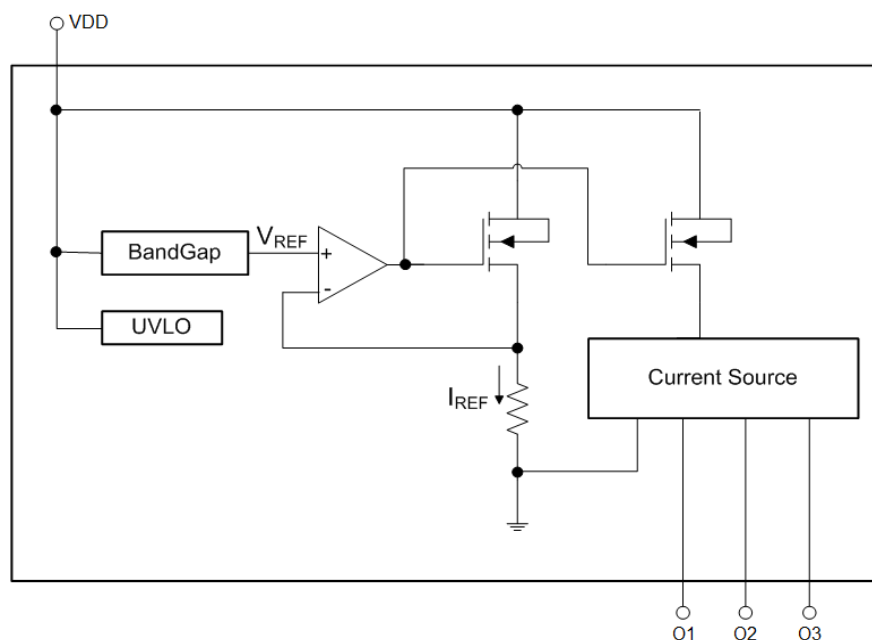
2. FEATURES

- (1). Wide operating voltage range: $V_{DD} = 1.8V \sim 6.4V$.
- (2). It can provide 3-channel constant current output with 20mA or 30mA, or 1-channel constant current output with 60mA or 90mA.
- (3). Very low dropout voltage for constant current. ($V_{OUT} \geq 0.2V$)
- (4). Less than 1%/V load or line regulation.
- (5). ZTC current compensation for constant current in wide range temperature of $-40 \sim +85^{\circ}C$.
- (6). When VDD is under 1.6V, the Under-Voltage-Lock-Out (UVLO) function will be enabled to prevent IC or circuit unstable while power up or unstable.
- (7). Output short / open circuit protection for each channel.
- (8). High 4KV HBM ESD protection.
- (9). Various shipping type for different application requirement. (*Accept customized output current*)

P/N	Channel No.	LED Sink Current	Package
NY1D003BS3-160	1	60mA	SOT23-3
NY1D003BS3-190	1	90mA	SOT23-3
NY1D003BS5-320	3	20mA	SOT23-5
NY1D003BS5-330	3	30mA	SOT23-5



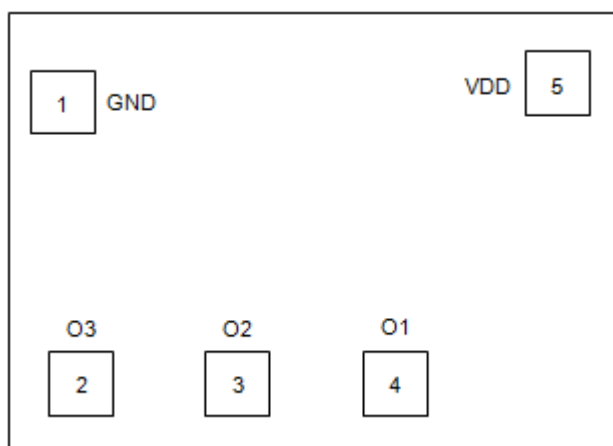
3. BLOCK DIAGRAM



4. PAD DESCRIPTION

Pad Name	Pad No.	ATTR.	Description
GND	1	Power	Negative power.
O3	2	O	LED output channel-3, sink connection. 20 or 30mA output current.
O2	3	O	LED output channel-2, sink connection. 20 or 30mA output current. (60 or 90mA output current for only 1-ch)
O1	4	O	LED output channel-1, sink connection. 20 or 30mA output current.
VDD	5	Power	Positive power.

5. PAD DIAGRAM



* The IC substrate must be connected to GND or Floating.

6. ELECTRICAL CHARACTERISTICS

6.1 Absolute Maximum Rating

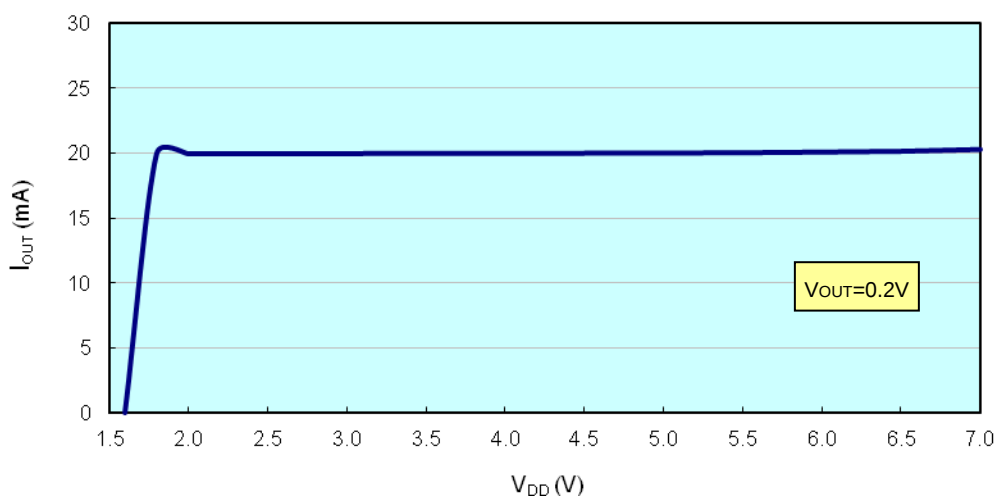
Symbol	Parameter	Rating	Unit
V _{DD} ~GND	Supply voltage	-0.5 ~ +7.0	V
V _{IN}	Input voltage	GND-0.3 < V _{IN} < V _{DD} +0.3	V
V _{OUT}	Output voltage	GND < V _{OUT} < V _{DD}	V
P _D	Power dissipation	350	mW
θ _{JA}	Thermal Resistance	220	°C/W
T _A	Ambient temperature	-40 ~ +85	°C
T _J	Junction temperature	150	°C
T _{ST}	Storage temperature	-65 ~ +150	°C

6.2 DC Characteristics (V_{DD}=5.0V, V_{OUT}=2.0V, T_A=25°C, unless otherwise specified)

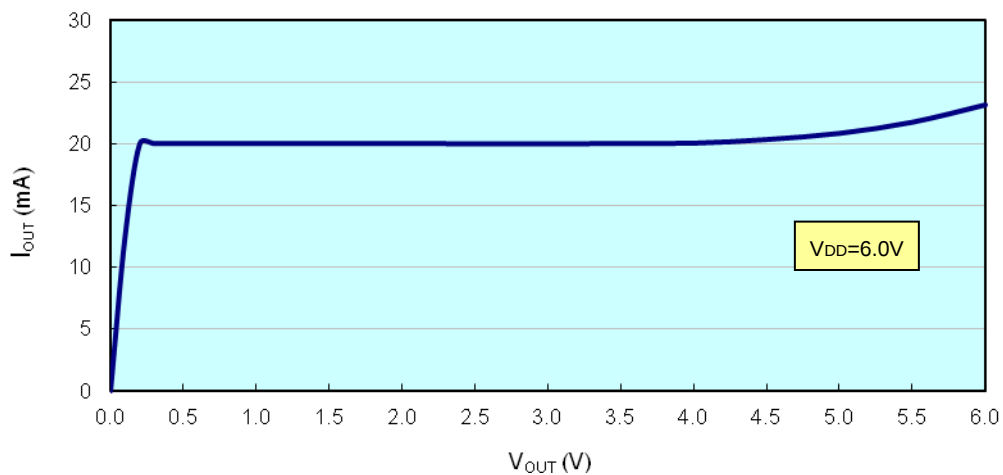
Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
V _{DD}	Operating voltage	1.8		6.4	V	
I _{OP}	Operating current		200		μA	V _{DD} =3V, no loading
			230		μA	V _{DD} =5V, no loading
V _{UVLO}	Under Voltage Lock Out		1.6		V	
V _{OUT}	Output low voltage	0.2			V	I _{OUT} = 20mA
		0.3			V	I _{OUT} = 30mA
I _{OUT}	Chip current deviation (20mA)	19	20	21	mA	V _{OUT} ≥ 0.2V
	Chip current deviation (30mA)	28.5	30	31.5	mA	V _{OUT} ≥ 0.3V
ΔI _{CH}	Channel current deviation	-1		1	%	$\frac{I_{max} - I_{average}}{I_{average}}$ $\frac{I_{average} - I_{min}}{I_{average}}$
ΔI _T	Temperature current deviation	-1.5		1.0	%	-40 ~ +85°C

7. OPERATING CHARACTERISTICS

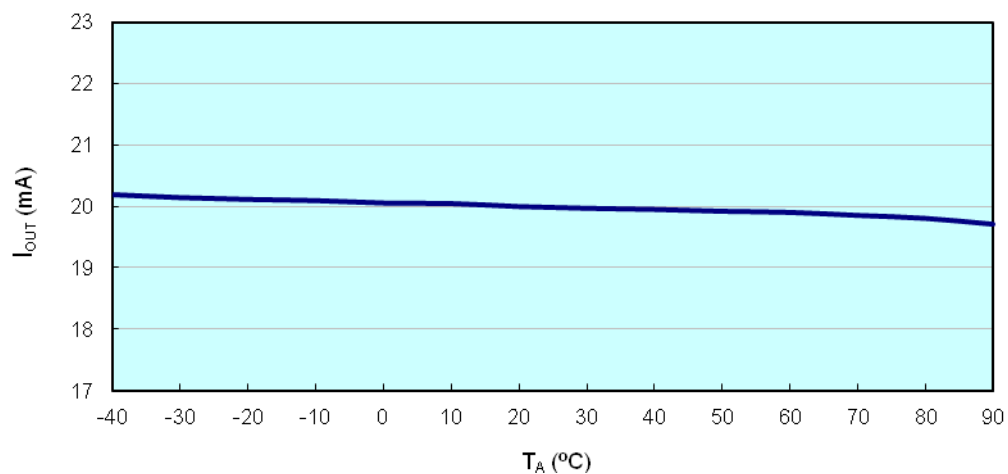
LED Current vs. Input Voltage (Line Regulation)



LED Current vs. Output Voltage (Load Regulation)

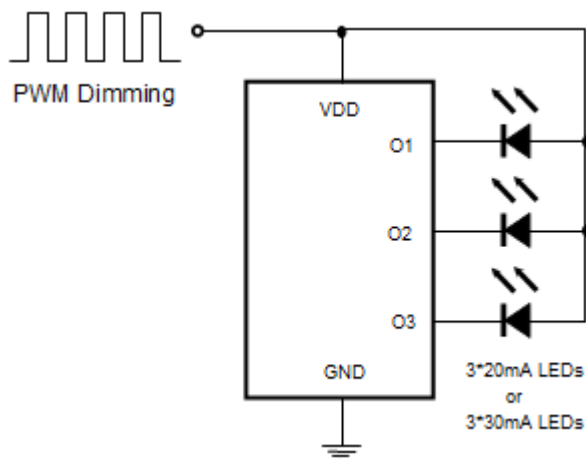


LED Current vs. Temperature

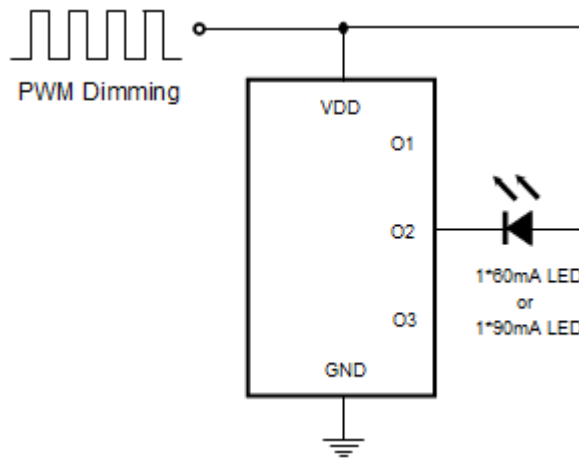


8. APPLICATION CIRCUIT

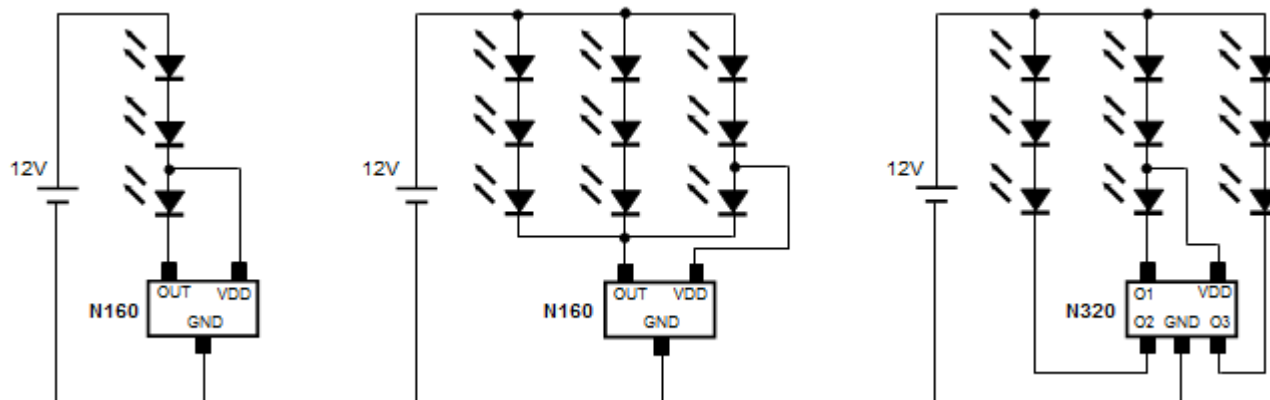
(1) 3 LEDs with VDD PWM Dimming Control



(2) 1 LED with VDD PWM Dimming Control



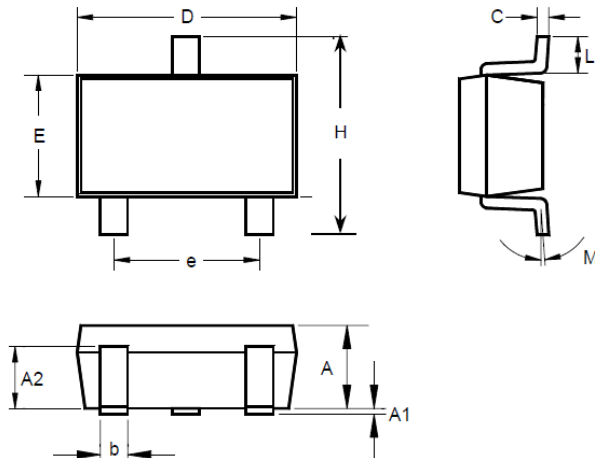
(3) N120, N160 and N320 for 12V Light Bar



** Please contact Nyquest or her agents for more application such as LED Lighting, LED Light Bar, LCD Backlight or RGB Lighting.*

9. PACKAGE DIMENSION

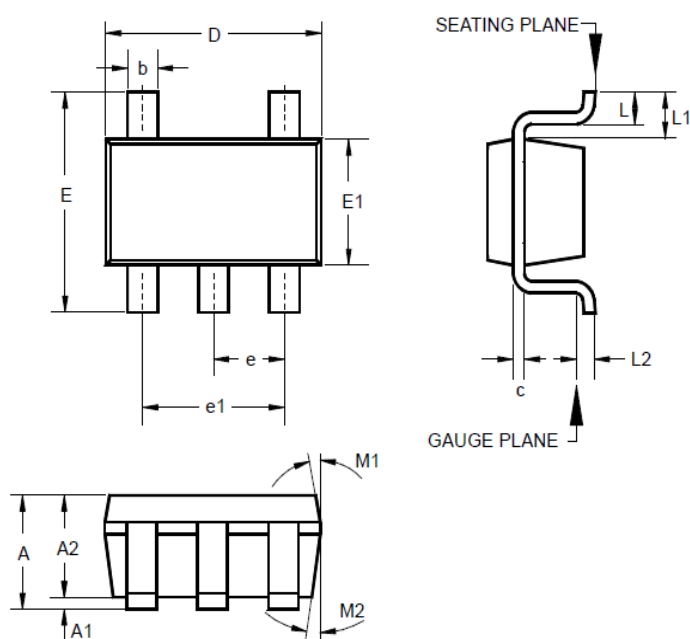
9.1 3-Pin Plastic SOT23-3 (63 mil)



SYMBOL	MILLIMETERS		
	MIN	TYP	MAX
A	1.00	1.10	1.30
A1	0.00	0.05	0.10
A2	0.70	0.80	0.90
b	0.32	0.35	0.38
C	0.08	0.15	0.25
D	2.70	2.90	3.10
E	1.57	1.60	1.63
e	1.90 TYP.		
H	2.75	2.80	2.85
L	0.20	0.40	0.50
M	0°	5°	9°

Note: For SOT23-3 IC, 3000 units per reel.

9.2 5-Pin Plastic SOT23-5 (63 mil)



SYMBOL	MILLIMETERS		
	MIN	TYP	MAX
A	1.09	1.15	1.21
A1	0.02	0.05	0.08
A2	1.07	1.10	1.13
b	0.32	0.35	0.38
c	0.10	0.15	0.20
D	2.80	2.90	3.00
E	2.60	2.80	3.00
E1	1.50	1.60	1.70
e	0.95 BSC		
e1	1.90 BSC		
L	0.37	0.40	0.60
L1	0.60 REF		
L2	0.25 BSC		
M1	7° REF		
M2	7° REF		

Note: For SOT23-5 IC, 3000 units per reel.

10. ORDERING INFORMATION

<i>P/N</i>	<i>Shipping Type</i>	<i>Remarks</i>
NY1D003B-160	Die	1 channels LED Driver with 60mA.
NY1D003B-190	Die	1 channels LED Driver with 90mA.
NY1D003B-1xx	Die	1 channels LED Driver with customized current.
NY1D003B-320	Die	3 channels LED Driver each with 20mA.
NY1D003B-330	Die	3 channels LED Driver each with 30mA.
NY1D003B-3xx	Die	3 channels LED Driver each with customized current.
NY1D003BS3-160	SOT23-3	1 channel LED Driver with 60mA.
NY1D003BS3-190	SOT23-3	1 channel LED Driver with 90mA.
NY1D003BS3-1xx	SOT23-3	1 channels LED Driver each with customized current.
NY1D003BS5-320	SOT23-5	3 channels LED Driver each with 20mA.
NY1D003BS5-330	SOT23-5	3 channels LED Driver each with 30mA.
NY1D003BS5-3xx	SOT23-5	3 channels LED Driver each with customized current.