NSM-1K2QxxxMG

Rev.A

Features

- Non-Isolated Design with Low Residual Output Voltage < 3kV
- Independent Four Output Channels
- Dynamic Power Transfer and Traditional Power Transfer Selectable
- Ultra High Efficiency (Up to 96%)
- Full Power at Wide Output Current Range (Constant Power)
- Adjustable Output Current (AOC)with Programmability
- INV Digital Dimming, UART Based Communication Protocol
- Integrated Power Metering with High Accuracy up to ±1%
- Dim-to-Off
- Hold Time Adjustable
- Fade Time Adjustable
- Always-on Auxiliary Power: 12Vdc, 500mA
- Low Inrush Current
- Output Lumen Compensation
- End-of-Life Indicator
- Input Surge Protection: DM 6kV, CM 10kV
- All-Around Protection: IUVP, IOVP, OVP, SCP, OTP, OPP
- 5 Years Warranty

Description

The *NSM-1K2QxxxMG* series is a 1200W, 4-channel, constant-current, programmable LED driver that operates from 249-528Vac input with excellent power factor. It provides an auxiliary voltage and dim-to-off functionality for powering low voltage, wireless controls. The dimming control supports two-way communication via Digital Dimming, a UART based communication protocol. The high efficiency of these drivers enables them to run cooler, significantly improving reliability and extending product life. To ensure trouble free operation, protection is provided against input surge, input under voltage, input over voltage, output over voltage, short circuit, over temperature and over power.

Models

Channel	Adjustable Output	Full-Power	Default Output	Output Voltage	Max. Output	Typical Efficiency	Typical Power Factor		Typical Ficiency Ficiency		Model Number ⁽³⁾
Channer	Current Range(A)	Range(A) ⁽¹⁾	Current(A)	Range (Vdc)	Power (W)	(2)	277Vac	480Vac			
1	0.13-2	1.3-2	1.4	200-500	660				NSM-1K2Q200MG		
2	0.14-2.2	1.4-2.2	1.4	40-129	180	05 50/	0.00	0.05			
3	0.14-2.2	1.4-2.2	1.4	40-129	180	95.5%	0.99	0.95			
4	0.14-2.2	1.4-2.2	1.4	40-129	180	-					

Notes: (1) Output current range with constant power at 1200W.

(2) Measured at 100% load and 480Vac input (see below "General Specifications" for details).

(3) Certified input voltage range: 277-480Vac.



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• Dynamic Power Transfer

This function is optional. the real-time power of main channel (CH1) can be dynamically varied follows the power change of other three sub-channels, and ensure the total power of all channel is constant, the total output power can be set based on the application demand through Inventronics Programing Software.

• Traditional Power Transfer

This function is optional, when one of channel 2, 3, 4 or all of them is dim-to-off, part or all of its power can be transferred to channel 1 by setting Inventronics Programing Software.

Channel	Adjustable Output Current Range(A)	Full-Power Current Range(A) ⁽¹⁾	Default Output Current (A)	Output Voltage Range (Vdc)	Max. Output Power (W)	Typical Efficiency ⁽²⁾	Notes		
1	0.13-2	1.3-2	1.4	200-500	660				
2	0.14-2.2	1.4-2.2	1.4	40-129	180	05 50/	Mode 1		
3	0.14-2.2	1.4-2.2	1.4	40-129	180	95.5%	CH2, CH3, CH4 are all on		
4	0.14-2.2	1.4-2.2	1.4	40-129	180				
1	0.17-2.5	1.7-2.5	2.1	200-500	840				
	0.14-2.2	1.4-2.2	1.4	40-129	180	00.00/	Default Mode		
2/3/4	0.14-2.2	1.4-2.2	1.4	40-129	180	96.0%	One of CH2, CH3. CH4 is off		
	-	-	-	-	0				
1	0.2-3.1	2.0-3.1	2.8	200-500	1020				
	0.14-2.2	1.4-2.2	1.4	40-129	180	00.5%	Mode 3		
2/3/4	-	-	-	-	0	96.5%	Two of CH2, CH3, CH4 are off		
	-	-	-	-	0				
1	0.24-3.6	2.4-3.6	3.5	200-500	1200				
	-	-	-	-	0	07.00/	Mode 4		
2/3/4	-	-	-	-	0	97.0%	CH2, CH3, CH4 are all off		
	-	-	-	-	0		1		

Power Transfer Combination

Notes: (1) Output current range with constant power at 1200W.

(2) Measured at 100% load, default current and 480Vac input.

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I-V Operation Area



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All specifications are typical at 25 °C unless otherwise stated.

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Input Specifications

Parameter	Min.	Тур.	Max.	Notes
Input AC Voltage	249 Vac	-	528 Vac	
Input DC Voltage	352 Vdc	-	500 Vdc	
Input Frequency	47 Hz	-	63 Hz	
Leakage Current	-	-	0.70 mA	IEC 60598-1; 480Vac/60Hz, grounding effectively
	-	-	5.06 A	Measured at 100% load and 277 Vac input.
	-	-	2.99 A	Measured at 100% load and 480 Vac input.
Inrush Current(I ² t)	-	-	0.32 A ² s	At 480Vac input, 25°C cold start, duration=27.0 ms, 10%lpeak-10%lpeak.
PF	0.90	-	-	At 277-480Vac, 50-60Hz, 60%-100% Load
THD	-	-	20%	(720-1200W)
THD	-	-	12%	At 277-480Vac, 50-60Hz,100% Load

Output Specifications

Parameter	Min.	Тур.	Max.	Notes
Output Current Tolerance	-5%loset	-	5%loset	At 100% load condition
Output Current Setting(loset) Range				
CH1 CH2 CH3 CH4	130 mA 140 mA 140 mA 140 mA	- - - -	2000 mA 2200 mA 2200 mA 2200 mA	
Output Current Setting Range with Constant Power				
CH1 CH2 CH3 CH4	1300 mA 1400 mA 1400 mA 1400 mA	- - - -	2000 mA 2200 mA 2200 mA 2200 mA	
Total Output Current Ripple (pk-pk)	-	5%lomax	10%Iomax	100% load. 20 MHz BW
Output Current Ripple at < 200 Hz (pk-pk)	-	2%lomax	-	70%-100% load
Startup Overshoot Current	-	-	10%lomax	100% load
No Load Output Voltage CH1 CH2 CH3 CH4 CH4		- - -	600 V 150 V 150 V 150 V	
Line Regulation	-	-	±2.5%	100% load
Load Regulation	-	-	±5.0%	
Turn-on Delay Time	-	-	3 s	Measured at 277-480Vac input, 65%-100% load

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Output Specifications (Continued)

Parameter	Min.	Тур.	Max.	Notes
Temperature Coefficient of loset	-	0.06%/°C	-	Case temperature = 0°C ~Tc max
12V Auxiliary Output Voltage	10.8 V	12 V	13.2 V	
12V Auxiliary Output Source Current	0 mA	-	500 mA	Return terminal is "Dim–"
12V Auxiliary Output Transient Peak Current@10W	-	-	850 mA	850mA peak for a maximum duration of 1.3ms in a 5.2ms period during which time the average should not exceed 500mA.

General Specifications

Parameter	Min.	Тур.	Max.	Notes
Efficiency at 277 Vac input: CH1+CH2+CH3+CH4 lo= (1300+1400+1400+1400) mA lo= (2000+2200+2200+2200) mA	93.5% 93.5%	95.5% 95.5%	- -	Measured at 100% load and steady-state temperature in 25°C ambient; (Efficiency will be about 2.0% lower if measured immediately after startup.)
Efficiency at 400 Vac input: CH1+CH2+CH3+CH4 lo= (1300+1400+1400+1400) mA lo= (2000+2200+2200+2200) mA	94.0% 93.5%	96.0% 95.5%	- -	Measured at 100% load and steady-state temperature in 25°C ambient; (Efficiency will be about 2.0% lower if measured immediately after startup.)
Efficiency at 480 Vac input: CH1+CH2+CH3+CH4 lo= (1300+1400+1400+1400) mA lo= (2000+2200+2200+2200) mA	93.5% 93.5%	95.5% 95.5%	- -	Measured at 100% load and steady-state temperature in 25°C ambient; (Efficiency will be about 2.0% lower if measured immediately after startup.)
Standby Power	-	1.5 W	-	Measured at 480Vac/50Hz; Dimming off
MTBF	-	210,000 Hours	-	Measured at 480Vac input, 80%load and 25°C ambient temperature (MIL-HDBK-217F)
Lifetime	-	54,000 Hours	-	Measured at 480Vac input, 80%load and 80°C case temperature; See lifetime vs. Tc curve for the details
	-	96,000 Hours	-	Measured at 277Vac input, 100%Load and 40°C ambient temperature
Operating Case Temperature for Safety Tc_s	-20°C	-	+90°C	
Operating Case Temperature for Warranty Tc_w	-20°C	-	+80°C	Case temperature for 5 years warranty Humidity: 10% RH to 95% RH;
Storage Temperature	-40°C	-	+85°C	Humidity: 5%RH to 95%RH
Dimensions Inches (L × W × H) Millimeters (L × W × H)	18.66 × 3.54 × 1.91 474 × 90 × 48.5			With mounting ear 19.64 × 3.54 × 1.91 499 × 90 × 48.5
Net Weight	-	4250 g	-	

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Dimming Specifications

Parameter		Min.	Тур.	Max.	Notes	
Absolute Maximum Voltage on the Vdim (+) Pin		-20 V	-	20 V		
Source Current on Vdim (+) Pin		90 µA	100 µA	110 µA	Vdim(+) = 0 V	
Dimming	CH1 CH2/CH3/CH4	10%loset	- loset		1300 mA ≤ loset ≤ 2000 mA 1400 mA ≤ loset ≤ 2200 mA	
Output Range	CH1 CH2/CH3/CH4	130 mA 140 mA	- loset		130 mA ≤ loset ≤ 1300 mA 140 mA ≤ loset ≤ 1400 mA	

Safety & EMC Compliance

Safety Category	Standard
CE	EN 61347-1, EN 61347-2-13
СВ	IEC 61347-1, IEC 61347-2-13
EMI Standards	Notes
EN IEC 55015 ⁽¹⁾	Conducted emission Test & Radiated emission Test
EN IEC 61000-3-2	Harmonic current emissions
EN 61000-3-3	Voltage fluctuations & flicker
EMS Standards	Notes
EN 61000-4-2	Electrostatic Discharge (ESD): 8 kV air discharge, 4 kV contact discharge
EN 61000-4-3	Radio-Frequency Electromagnetic Field Susceptibility Test-RS
EN 61000-4-4	Electrical Fast Transient / Burst-EFT
EN 61000-4-5	Surge Immunity Test: AC Power Line: Differential Mode 6 kV, Common Mode 10 kV
EN 61000-4-6	Conducted Radio Frequency Disturbances Test-CS
EN 61000-4-8	Power Frequency Magnetic Field Test
EN 61000-4-11	Voltage Dips
EN 61547	Electromagnetic Immunity Requirements Applies To Lighting Equipment

Note: (1) This LED driver meets the EMI specifications above, but EMI performance of a luminaire that contains it depends also on the other devices connected to the driver and on the fixture itself.

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Lifetime vs. Case Temperature



Inrush Current Waveform



Input AC Voltage	I _{peak}	t _{width} (@ 50% Ipeak)
277Vac	2.38 A	10.0 ms
400Vac	3.38 A	10.8 ms
480Vac	4.00 A	11.0 ms

МСВ	Tripping Curves	В	В	В	В	С	С	С	С
	Rated Current	10A	16A	20A	25A	10A	16A	20A	25A
The Number of LED	277Vac	1	2	2	3	1	2	3	3
The Number of LED Driver can be Configured	400Vac	1+1+1	1+1+1	2+2+2	2+2+2	1+1+1	2+2+2	2+2+2	3+3+3
	480Vac	1+1+1	2+2+2	2+2+2	3+3+3	1+1+1	2+2+2	3+3+3	3+3+3

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Efficiency vs. Load



Power Factor



Total Harmonic Distortion



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Protection Functions

Par	ameter	Min.	Тур.	Max.	Notes			
Over Voltage P	rotection	Limits output voltage at no load and in case the normal voltage limit fails.						
Short Circuit Pr	otection	Auto Recovery. No damage will occur when any output is short circuited. The output shall return to normal when the fault condition is removed.						
Over Temperat	ure Protection	Decreases of removed	output current	gradually, retu	rning to normal after over temperature is			
Over Power Pro	otection ⁽¹⁾⁽²⁾	102%	107%	112%				
Input Under Voltage	Input Under Voltage Protection	220 Vac	230 Vac	240 Vac	Turn off the output when the input voltage falls below protection voltage.			
Protection (IUVP)	Input Under Voltage Recovery	230 Vac	240 Vac	250 Vac	Auto Recovery. The driver will restart when the input voltage exceeds recovery voltage.			
Input Over	Input Over Voltage Protection	550 Vac	570 Vac	590 Vac	Turn off the output when the input voltage exceeds protection voltage.			
Voltage Protection (IOVP)	Input Over Voltage Recovery	530 Vac	550 Vac	570 Vac	Auto Recovery. The driver will restart when the input voltage falls below recovery voltage.			
	Max. of Input Over Voltage	-	-	590 Vac	The driver can survive for 8 hours with a stable input voltage stress of 590Vac.			

Notes: (1) When driver works in traditional power transfer mode, channel 1 exceeds 107% (typical) rated power(1200W), or one of channel 2, 3, 4 exceeds 107% (typical) rated power (180W), the driver will decrease this channel output current automatically.

(2) When driver works in dynamic power transfer mode, channel 1 exceeds 107% (typical) actual working power*, or one of channel 2, 3, 4 exceeds 107% (typical) rated power (180W), the driver will decrease this channel output current automatically.

* The power of main channel (CH1) = Setting total output power - real-time output power of channel 2.3.4.

• Input Under Voltage Protection Diagram



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Input Over Voltage Protection Diagram



• Output Lumen Compensation

Output Lumen Compensation (OLC) may be used to maintain constant light output over the life of the LEDs by driving them at a reduced current when new, then gradually increasing the drive current over time to counteract LED lumen degradation.

• Hold Time Adjustable

When AC power is first applied to the LED driver, enabling a "Hold" period can allow devices powered by the Auxiliary voltage to stabilize before the driver fades up to the maximum dimming level. During this period, the driver will not respond to external dimming commands but will respond again after the hold time ends. Both the initial dimming percentage and the duration of this hold period can be adjusted by the Inventronics Multi Programmer. This function is disabled by default

• Fade Time Adjustable

There is a "Fade" period after the "Hold" period. The soft-start time and dimming slope applied to all dimming transitions can be adjusted individually. It is adjusted by the Inventronics Multi Programmer. This function is disabled by default.

End Of Life

End-of-Life (EOL) is providing a visual notification to a user that the LED module has reached the end of manufacturer-specified life and that the replacement is recommended. Once active, an indication is given at each power-up of the driver, which the driver indicates this through a lower light output during the first 1 minute before normal operation is continued.

• Digital Dimming

Inventronics Digital Dimming is a UART (Universal Asynchronous Receive Transmitter) based communication protocol. Please refer to **Inventronics Digital Dimming** file for details.

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Programming Connection Diagram



Note: The driver does not need to be powered on during the programming process.

Please refer to <u>PRG-MUL2</u> (Programmer) datasheet for details.



RoHS Compliance

Our products comply with reference to RoHS Directive (EU) 2015/863 amending 2011/65/EU, calling for the elimination of lead and other hazardous substances from electronic products.

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Revision History

Change	Pov	Description of Change						
Date	Rev.	Item	From	То				
2025-05-23	А	Datasheet Release	/	/				

Specifications are subject to changes without notice.

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