

80V 0.5A Switching Current Buck PFM LED Constant Current Driver

XL8003

Features

- n** Wide 24V to 80V Input Voltage Range
- n** 0.2V current sense voltage reference.
- n** Directly drive 3~8 series 1W LED.
- n** Excellent line and load regulation.
- n** High efficiency up to 96%.
- n** Internal optimize power HV-MOSFET.
- n** Built in thermal shutdown function.
- n** Built in UVLO function.
- n** Built in current limiting function.
- n** Built in LED open & short protection.
- n** Built in soft-start circuit.
- n** Available in SOIC-8 package.

General Description

The XL8003 is a monolithic high voltage switching regulator with PFM that is specifically designed to operate from a 24V~80V DC supply.

The XL8003 is a high efficiency LED driver switching regulator. The LED string is driven at DC constant current rather than constant voltage, thus providing constant current output and enhanced reliability.

Applications

- n** EBIKE LED Lighting
- n** LED Lighting & LED LAMP
- n** General purpose lighting



SOIC-8

Figure1. Package Type of XL8003

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Pin Configurations

NC	1	8	CSN
VDD	2	7	CSN
	XL8003		
CSP	3	6	VIN
SW	4	5	VIN

Figure2. Pin Configuration of XL8003 (Top View)

Table 1 Pin Description

Pin Number	Pin Name	Description
1	NC	No Connected.
2	VDD	The chip supply voltage.
3	CSP	Current Sense Positive Terminal.
4	SW	Output Switching Pin
5, 6	VIN	Input high voltage Pin. (Operation voltage 24V~ 80V)
7, 8	CSN	Current Sense Negative Terminal.

Function Block

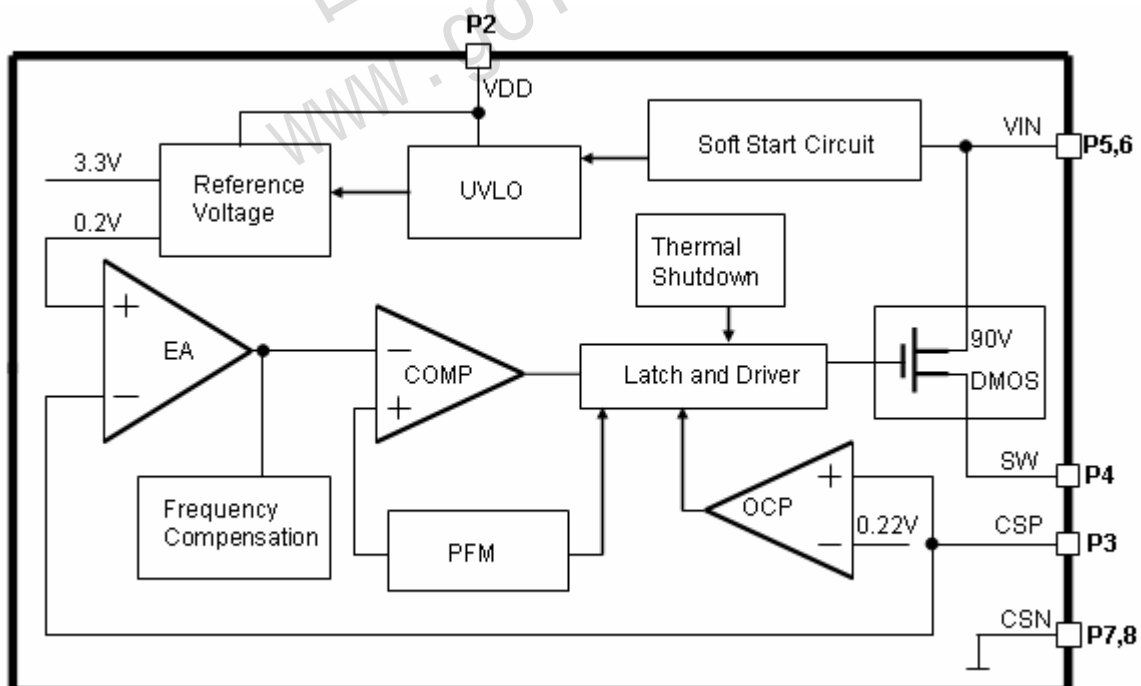


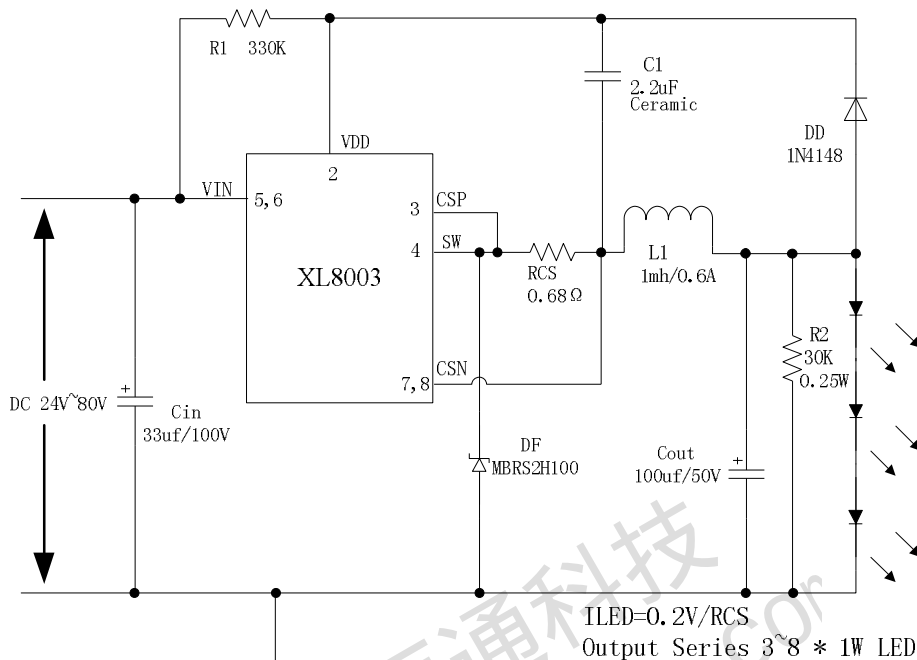
Figure3. Function Block Diagram of XL8003

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Typical application circuit



- [1] Input DC 24V~80V.
- [2] Output Constant Current Drive Series 3~8 * 1W LED.
- [3] Support Output LED Open & Short Protection.

Figure4. XL8003 Typical Application (3W~8W LED lamp)

Ordering Information

Order Information	Marking ID	Package Type	Packing Type Supplied As
XL8003E1	XL8003E1	SOIC-8	2500 Units on Tape & Reel

XLSEMI Pb-free products, as designated with “E1” suffix in the par number, are RoHS compliant.

Absolute Maximum Ratings (Note1)

Parameter	Symbol	Value	Unit
Input Voltage	V _{in}	-0.3 to 90	V
Power Dissipation	P _D	Internally limited	mW
Thermal Resistance (SOP-8L) (Junction to Ambient, No Heatsink, Free Air)	R _{JA}	100	°C/W
Operating Junction Temperature	T _J	-40 to 125	°C
Storage Temperature	T _{STG}	-65 to 150	°C
Lead Temperature (Soldering, 10 sec)	T _{LEAD}	260	°C
ESD (HBM)		3000	V

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XL8003

Note1: Stresses greater than those listed under Maximum Ratings may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operation is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

XL8003 Electrical Characteristics

$T_a = 25^{\circ}\text{C}$; unless otherwise specified. Reference test circuit figure4

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
VCSP	CSP Voltage	VIN = 24V to 80V, Iled=0.3A, Pout=8W	190	200	210	mV
Efficiency	η	VIN=48V, Iled=0.3A, Pout=8W	-	94.78	-	%
Efficiency	η	VIN=60V, Iled=0.3A, Pout=8W	-	93.99	-	%
Efficiency	η	VIN=72V, Iled=0.3A, Pout=8W	-	92.55	-	%

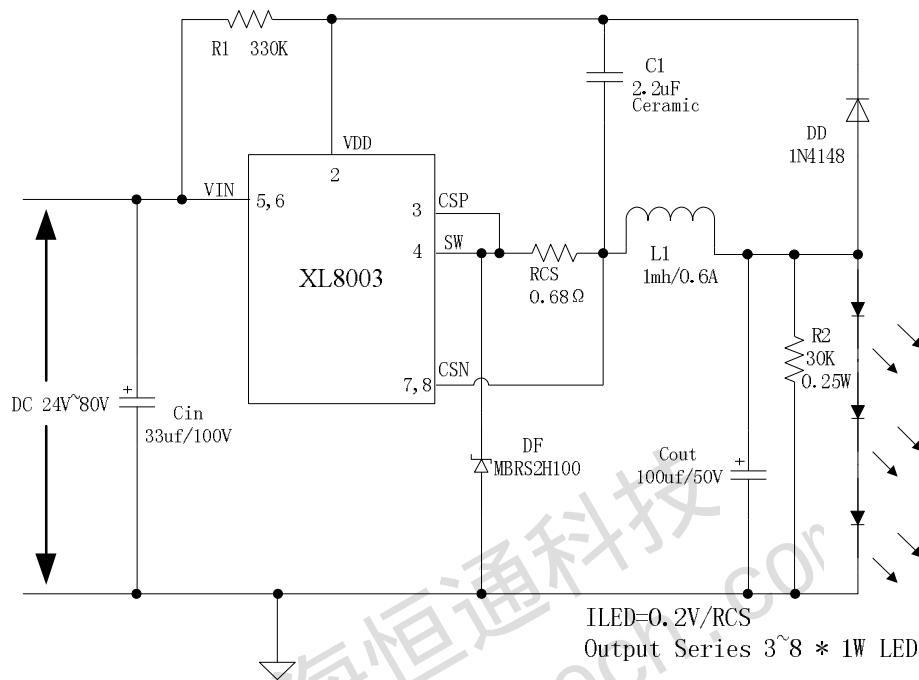
Electrical Characteristics (DC Parameters)

Parameters	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Input operation voltage	VIN		24		80	V
Switching Frequency	Fosc	Figure4 (8*1W) VIN=48V	53.8	67.2	80.6	KHz
Switching Frequency	Fosc	Figure4 (8*1W) VIN=60V	64.2	80.2	96.2	KHz
Switching Frequency	Fosc	Figure4 (8*1W) VIN=72V	70.0	87.4	104.8	KHz
Output LED open voltage	Vopen	Figure4 VIN=72V			36	V
DMOS Drain-Source Breakdown Voltage	VBRDS	VGS=0V, IDS=250uA	90			V
DMOS Drain-Source on resistor	RDS(on)	IDS=0.5A, VGS=10V		0.1	0.15	Ohm
Thermal Shutdown	OTP	Tj		165		$^{\circ}\text{C}$
Thermal Shutdown Window				25		$^{\circ}\text{C}$

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[1] Typical application circuit (3W ~ 8W)



- [1] Input DC 24V~80V.
 [2] Output Constant Current Drive Series 3~8 * 1W LED.
 [3] Support Output LED Open & Short Protection.

Figure5. XL8003 System Application (3W ~ 8W)

The figure5 system parameters as following:

VIN=36V DC						
1W LED Series	Vin(V)	Iin(mA)	Vout(V)	Iout(mA)	Fosc(KHz)	Efficiency(%)
3	35.97	89	9.60	297	44.9	89.06
4	35.98	114	12.79	294	50.0	91.68
5	35.98	140	16.07	291	53.7	92.84
6	35.97	164	19.22	289	53.0	94.16
7	35.96	188	22.41	287	49.1	95.14
8	35.96	212	25.68	285	41.8	96.00
VIN=48V DC						
1W LED Series	Vin(V)	Iin(mA)	Vout(V)	Iout(mA)	Fosc(KHz)	Efficiency(%)
3	47.99	68	9.62	300	47.6	88.44
4	47.99	87	12.79	298	56.2	91.29
5	47.99	107	16.07	295	62.6	92.32
6	47.98	125	19.21	292	66.6	93.53
7	47.98	144	22.41	290	68.1	94.06
8	47.98	162	25.67	287	67.2	94.78

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VIN=60V DC						
1W LED Series	Vin(V)	Iin(mA)	Vout(V)	Iout(mA)	Fosc(KHz)	Efficiency(%)
3	59.99	55	9.62	303	48.4	88.34
4	59.99	71	12.78	301	58.4	90.32
5	59.98	87	16.06	298	66.8	91.71
6	59.99	102	19.21	295	73.1	92.61
7	59.98	117	22.40	292	77.6	93.20
8	59.98	132	25.66	290	80.2	93.99
VIN=72V DC						
1W LED Series	Vin(V)	Iin(mA)	Vout(V)	Iout(mA)	Fosc(KHz)	Efficiency(%)
3	71.97	47	9.62	306	48.7	87.03
4	71.97	60	12.80	304	59.5	90.11
5	71.97	74	16.08	301	69.0	90.88
6	71.96	87	19.23	298	76.4	91.53
7	71.96	100	22.42	296	82.7	92.22
8	71.95	113	25.68	293	87.4	92.55

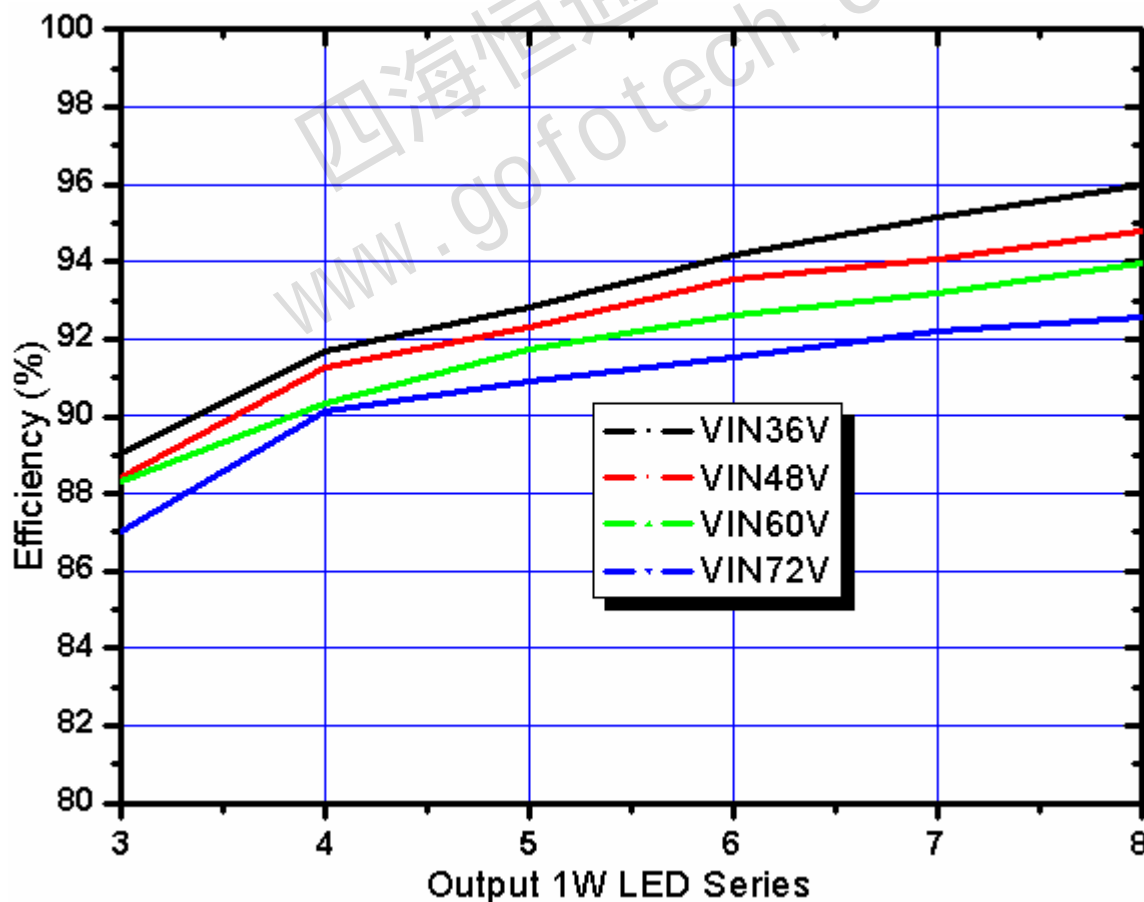


Figure6. XL8003 System efficiency curve

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