

High Performance Step-Down DC/DC Controller with DC and PWM dimming up to 78V

1 Description

The iW380-4X is a DC/DC step-down controller with tight current regulation and exceptional dimming performance for LED lighting. It is designed to be used in the high-side switching buck topology up to 78V input voltage and up to 98% of output voltage/input voltage ratio.

The iW380-4X supports high resolution DC dimming and high resolution, high frequency PWM dimming. The PWM dimming is achieved by only turning on the buck converter during PWM dimming signal ON time. To support highest dimming resolution, the iW380 also embeds the shunt MOSFET driver to short LED string during PWM dimming signal OFF time. This provides in most accurate LED current control.

A dedicated light-off mode in the iW380-4X turns off the output current when the dimming signal input is less than the light-off threshold. In the light-off mode, the iW380-4X consumes minimum power while still monitoring the dimming inputs. If the dimming signal input becomes higher than the light-on threshold, the iW380-4X can immediately wake up and resume output current regulation.

2 Features

- Input DC voltage range: 22V ~ 78V
- Output/input voltage ratio: up to 98%
- Output power up to 150W
- Advanced dimming control
 - Supports DC dimming and PWM dimming
 - DC Dimming range: 12.5%-100%
 - PWM dimming range: 0% to 100%
 - PWM dimming mode supports high frequency PWM dimming
 - Embedded shunt MOSFET driver enables highest resolution in PWM dimming mode
- Constant-current (CC) line and load regulation < $\pm 3\%$
- Light-off current consumption < 1mA
- Auto dimming signal type detection on ADJ pin
- Rich protections:
 - V_{VIN} over/under voltage
 - Over current protection (OCP)
 - Over temperature protection (OTP)

3 Applications

- High performance DC/DC LED driver
- Stage Lighting

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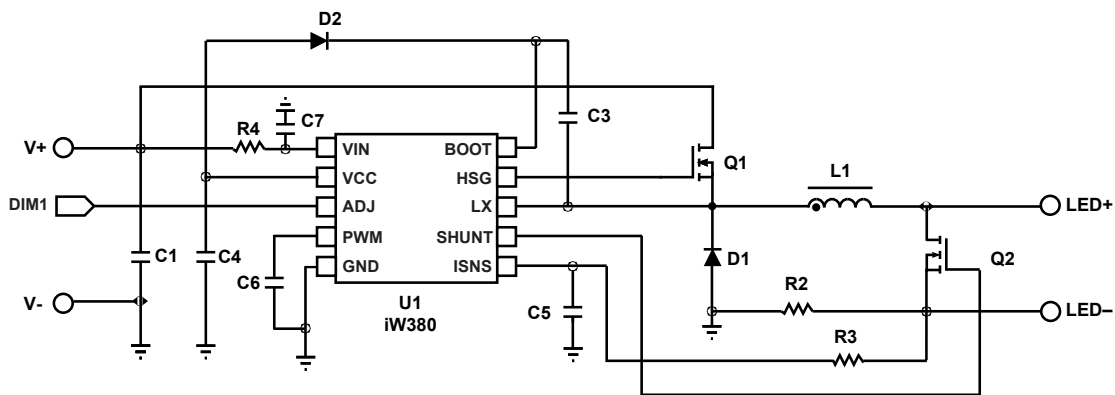


Figure 3.1 : iW380-4X Application Circuit with Shunt MOSFET for Highest Resolution Dimming

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4 Pinout Description

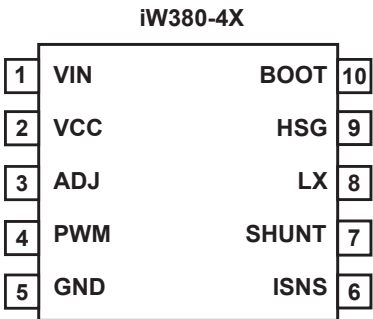


Figure 4.1 : 10-Lead SOIC Package

Pin Number	Pin Name	Type	Pin Description
1	VIN	Power	Power source and input voltage sensing
2	VCC	Power	IC power supply
3	ADJ	Analog Input	DC dimming signal input
4	PWM	Analog Input	PWM dimming signal input
5	GND	Ground	Ground reference
6	ISNS	Analog Input	Buck inductor current sensing
7	SHUNT	Analog Input	LED-short MOSFET driver
8	LX	Analog Input	Buck switching node, high-side power MOSFET source
9	HSG	Analog Output	High-side power MOSFET gate drive
10	BOOT	Power	Bootstrap high-side driver power supply

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5 Absolute Maximum Ratings

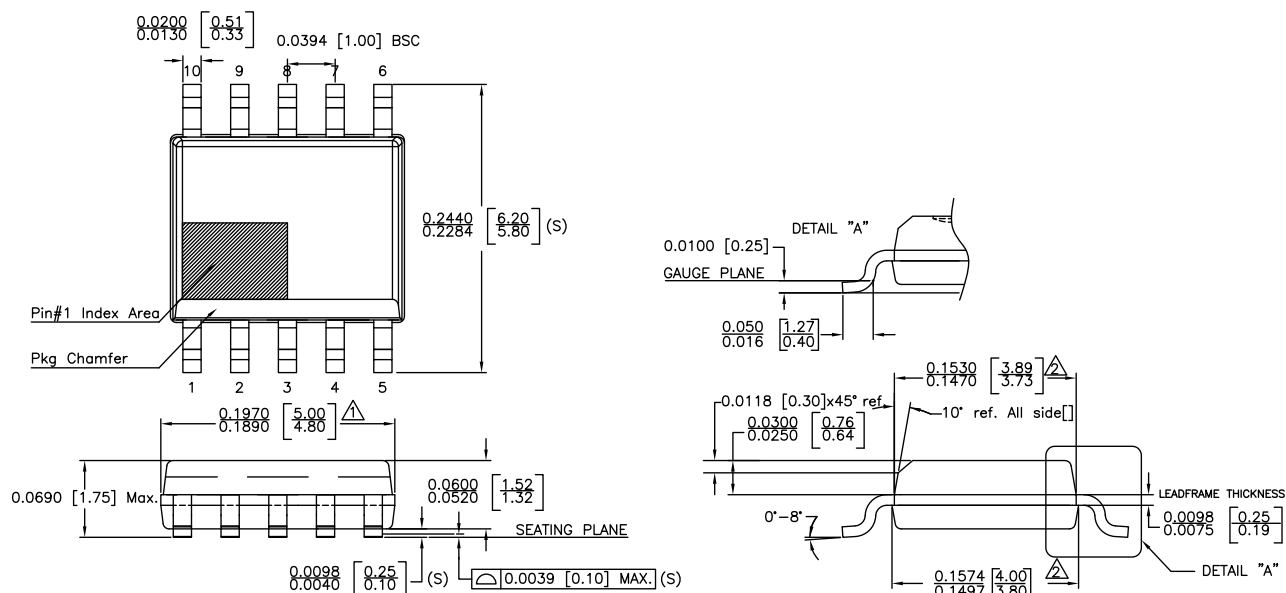
Absolute maximum ratings are the parameter values or ranges which can cause permanent damage if exceeded.

Parameter	Symbol	Value	Units
DC supply voltage range	V_{VCC}	-0.3 to 6.5	V
Continuous DC supply at VCC pin	I_{VCC}	20	mA
VIN pin		-0.3 to 82	V
ADJ and PWM pin		-0.3 to 6.5	V
ISNS pin		-0.3 to 6.5	V
SHUNT pin		-0.3 to 6.5	V
LX pin		-0.7 to 82	V
HSG pin (Note 1)		-0.3 to 87	V
BOOT pin (Note 1)		-0.3 to 87	V
Maximum junction temperature	T_{JMAX}	150	°C
Operating junction temperature	T_{JOPT}	-40 to 150	°C
Storage temperature	T_{STG}	-65 to 150	°C
Thermal resistance junction to ambient	θ_{JA}	209	°C/W
ESD rating per JEDEC JS-001-2017		±2000	V
Latch-up test per JESD78E		±100	mA

Note 1. BOOT pin and HSG pin respect to LX pin < 5.5V.

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6 Physical Dimensions



NOTE :

- △ DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS AND GATE BURRS SHALL NOT EXCEED .006 INCH PER SIDE.
- △ DOES NOT INCLUDE INTER-LEAD FLASH OR PROTRUSIONS. INTER-LEAD FLASH AND PROTRUSIONS SHALL NOT EXCEED .010 INCH PER SIDE.
3. PACKAGE DIMENSION CONFORM TO JEDEC SPECIFICATION MS-012 EXCEPT LEAD PITCH.
4. LEAD SPAN/STAND OFF HEIGHT/COPLANARITY ARE CONSIDERED AS SPECIAL CHARACTERISTIC.(S)
5. CONTROLLING DIMENSIONS IN INCHES.[mm]
6. PHYSICAL APPEARANCE OF PACKAGE (E-PIN, DIMPLE, CHAMFER) MAY VARY DUE TO ASSEMBLY TOOLINGS

STATUS:	
RELEASED	
TERMINAL FINISH:	
PPF or 100% Sn	
TITLE:	
SOP 10L 150MIL PACKAGE OUTLINE	
REV:	REVISION NOTE:
C	STANDARDIZED P00

Figure 6.1 : 10-Lead SOIC Package Outline Drawing

7 Ordering Information

Part Number	Status	Options	Package	Description
iW380-40	Active	V_{VIN} startup = 43V, ADJ hysteresis = 0.05% for PWM signal, 0.5% for analog signal	SOIC-10	Tape & Reel ¹
iW380-40B	Recommended for New Designs	V_{VIN} startup = 43V, ADJ hysteresis = 0.05% for PWM signal, 0.5% for analog signal	SOIC-10	Tape & Reel ¹
iW380-40C	Recommended for New Designs	V_{VIN} startup = 22V, ADJ hysteresis = 0.05% for PWM signal, 0.5% for analog signal, brownout protection disabled	SOIC-10	Tape & Reel ¹
iW380-41	Active	V_{VIN} startup = 49V, ADJ hysteresis = 0.05% for PWM signal, 0.5% for analog signal	SOIC-10	Tape & Reel ¹
iW380-42B	Recommended for New Designs	V_{VIN} startup = 58V, ADJ hysteresis = 0.05% for PWM signal, 0.5% for analog signal	SOIC-10	Tape & Reel ¹

Note 1. Tape and reel packing quantity is 2,500/reel. Minimum packing quantity is 2,500.

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